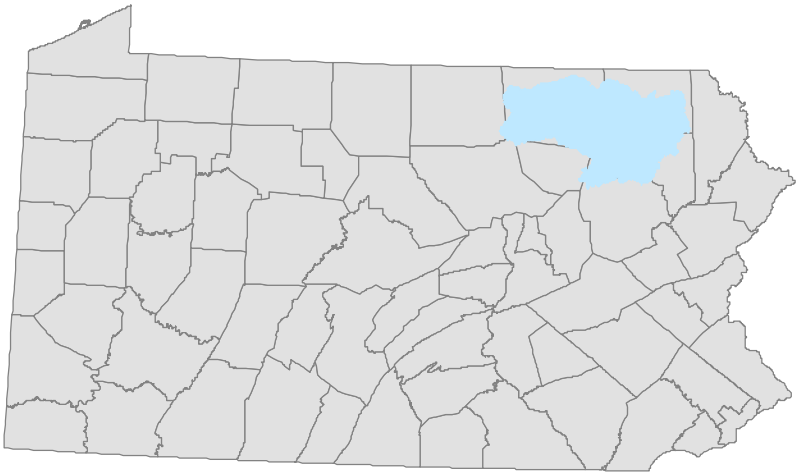


Rapid Watershed Assessment
Upper Susquehanna-Tunkhannock Watershed

Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help landowners and local leaders set priorities and determine the best actions to achieve their goals.

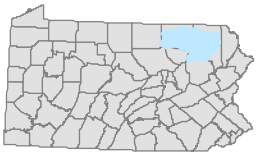
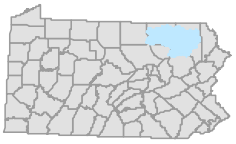


Table of Contents



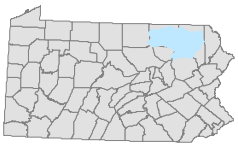
Preface

The Natural Resources Conservation Service (NRCS) is initiating rapid watershed assessments in order to increase the speed and efficiency generating resource information to guide conservation implementation, as well as the speed and efficiency of putting it into the hands of local decision makers. While these rapid assessments provide less detail and analysis than full-blown studies and plans, they do provide a foundation for watershed studies or area planning. In addition, the assessments provide the benefits of NRCS locally-led planning for resource conservation and conservation program implementation in less time and at a reduced cost than more complex studies.

Rapid watershed assessments will be valuable for Farm Bill program delivery, and provide useful information for county, watershed and regional planners. These assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments can help landowners and local leaders set priorities and determine the best actions to achieve their goals.

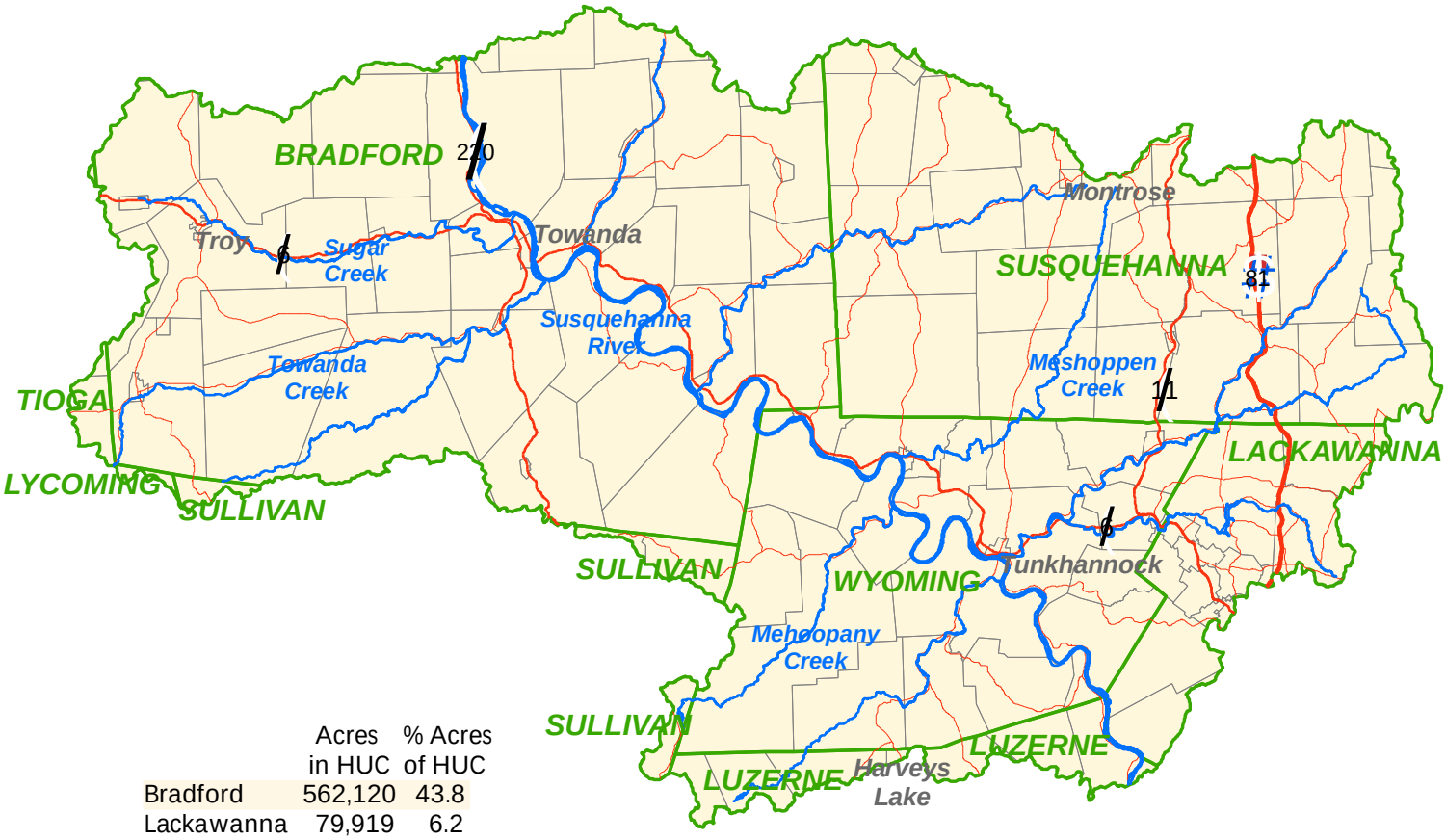
To produce the assessments, quantitative and qualitative data is collected and organized to create a watershed profile using Geographic Information System (GIS) technology. The data is analyzed to allow resource concerns and conditions to become apparent, and to generate maps and information to help people make better decisions about conservation needs and programs.

/s/ Craig R. Derickson
Pennsylvania State Conservationist

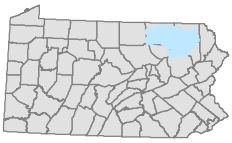


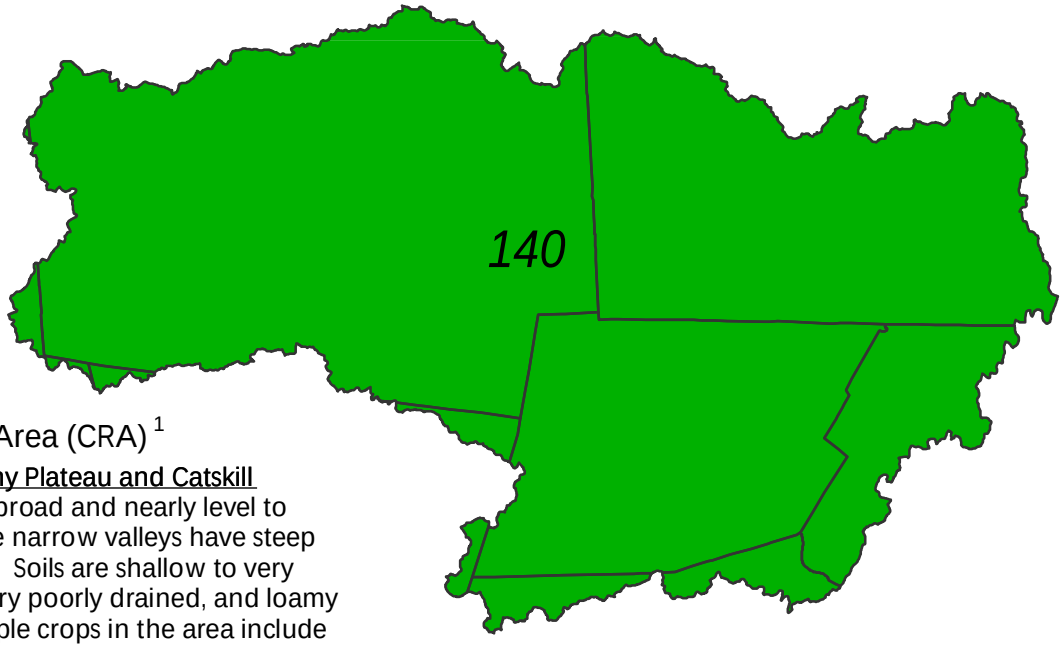
Introduction

The Upper Susquehanna-Tunkhannock Watershed is located in Northeast Pennsylvania in portions of Bradford, Lackawanna, Luzerne, Lycoming, Sullivan, Susquehanna, Tioga, and Wyoming Counties. The watershed is over 1,282,000 acres in size, of which approximately 420,800 acres is farmland. Seven Service Centers of the Natural Resources Conservation Services, eight county Conservation Districts and parts of the Endless Mountains and Pocono Northeast Resource Conservation and Development Council offices provide conservation assistance in this watershed.



	Acres in HUC	% Acres of HUC
Bradford	562,120	43.8
Lackawanna	79,919	6.2
Luzerne	36,558	2.9
Lycoming	1187	.1
Sullivan	16,028	1.3
Susquehanna	323,843	25.2
Tioga	5905	.5
Wyoming	256,472	20.0



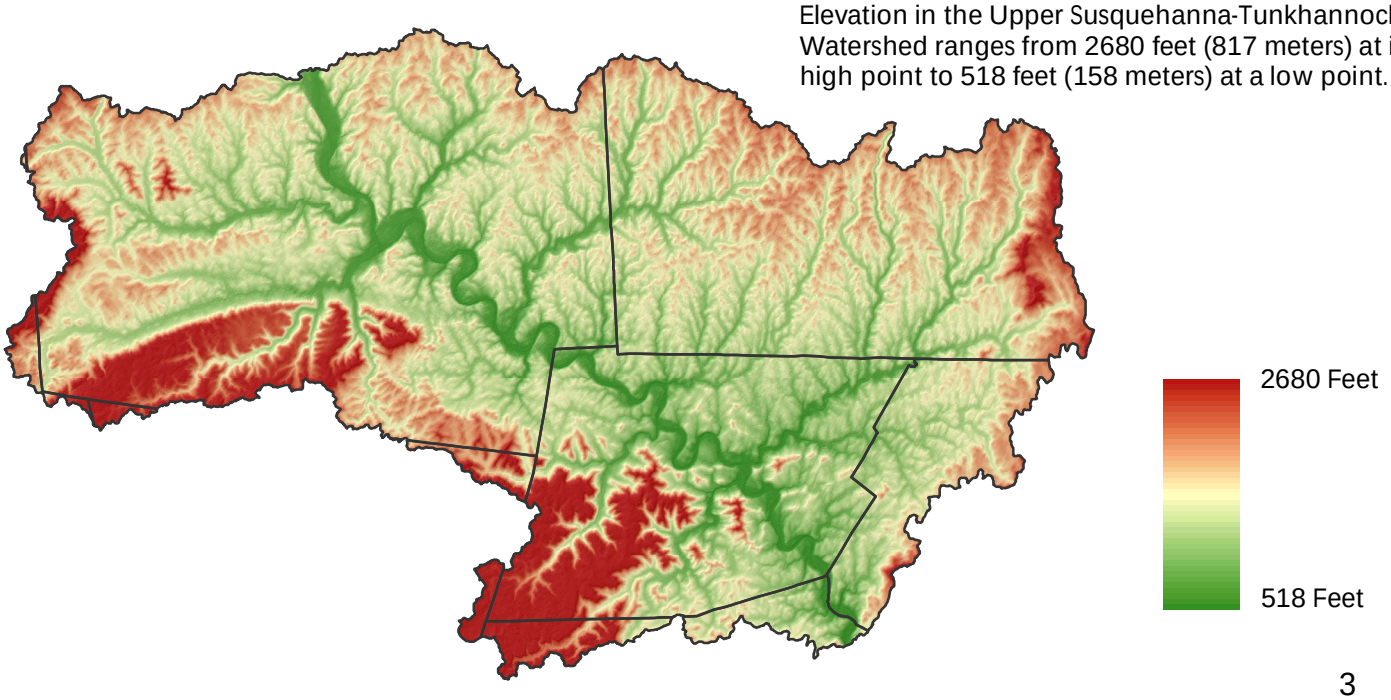


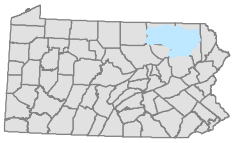
Common Resource Area (CRA) [1]

140 - Glaciated Allegheny Plateau and Catskill Mountains: This CRA is broad and nearly level to moderately sloping. The narrow valleys have steep walls and smooth floors. Soils are shallow to very deep, well drained to very poorly drained, and loamy or loamy-skeletal. Principle crops in the area include hay, pasture, and some grain for diary cattle.

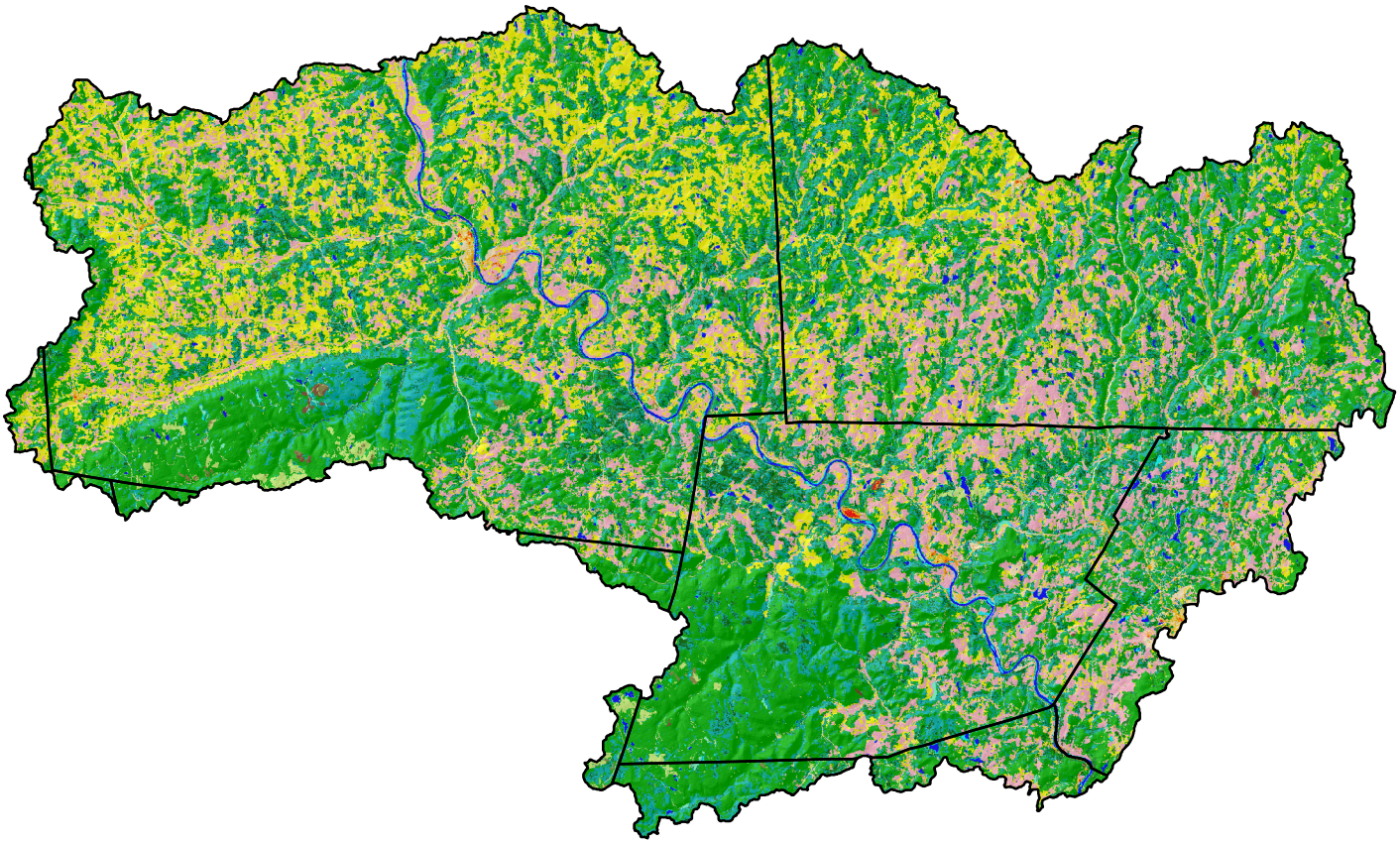
Elevation [2]

Elevation in the Upper Susquehanna-Tunkhannock Watershed ranges from 2680 feet (817 meters) at it's high point to 518 feet (158 meters) at a low point.

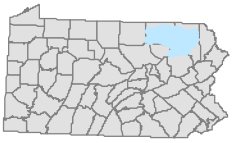


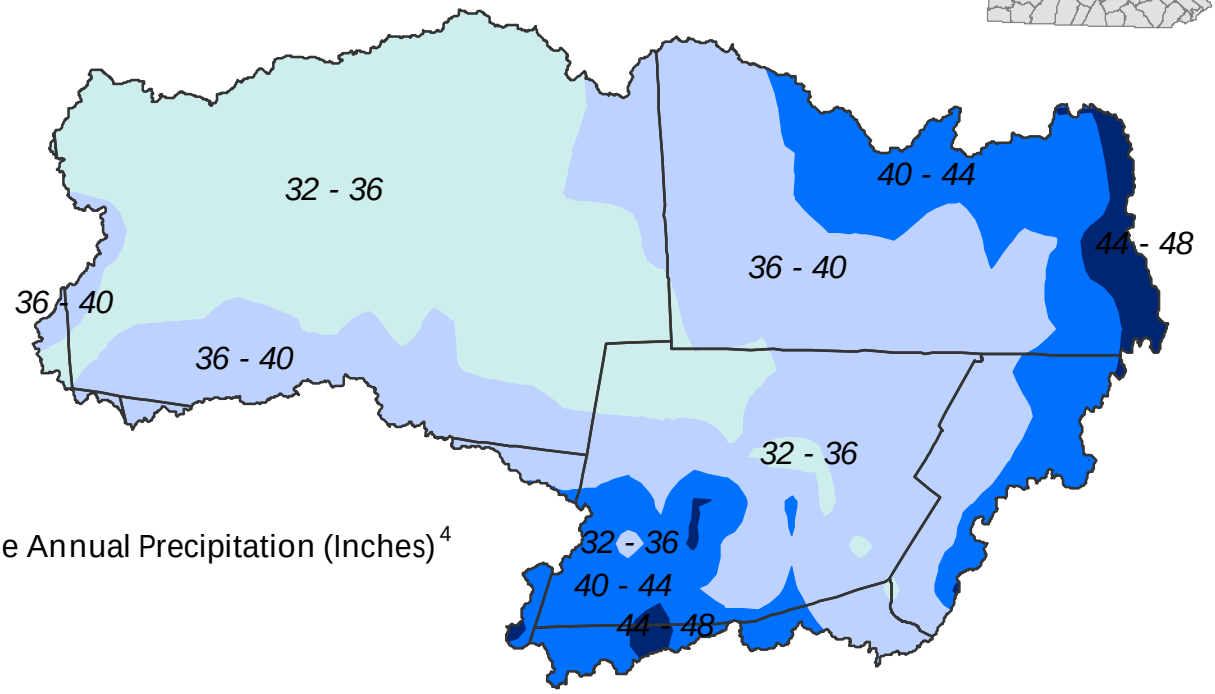


Land Use / Land Cover 2001[3]

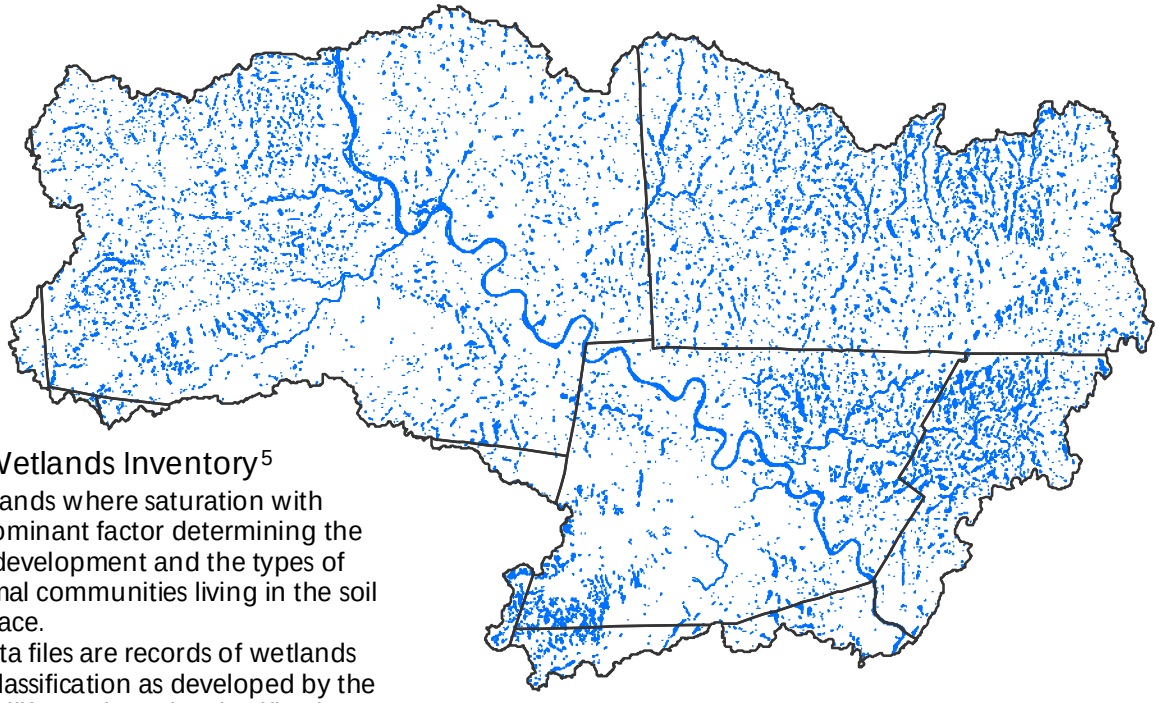


	Acres	Percent
Water	15,466.3	1.2
Developed, Open Space	54,200.7	4.2
Developed, Low Intensity	5860.4	.5
Developed, Medium Intensity	1770.1	.1
Developed, High Intensity	423.6	-
Barren Land (Rock, Sand, Clay)	1175.2	.1
Deciduous Forest	466,423.5	36.4
Evergreen Forest	79,889.7	6.2
Mixed Forest	206,567.6	16.1
Pasture / Hay	218,852.4	17.1
Cultivated Crops	201,989.5	15.8
Woody Wetlands	3851.6	.3
Emergent Herbaceous Wetlands	7464.1	.6
Shrub/Scrub	15,812.6	1.2
Grasslands/Herbaceous	2222.6	.2
County Boundary		





Average Annual Precipitation (Inches)[4]

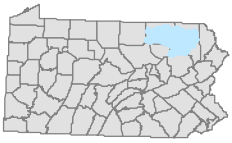


National Wetlands Inventory[5]

Wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface.

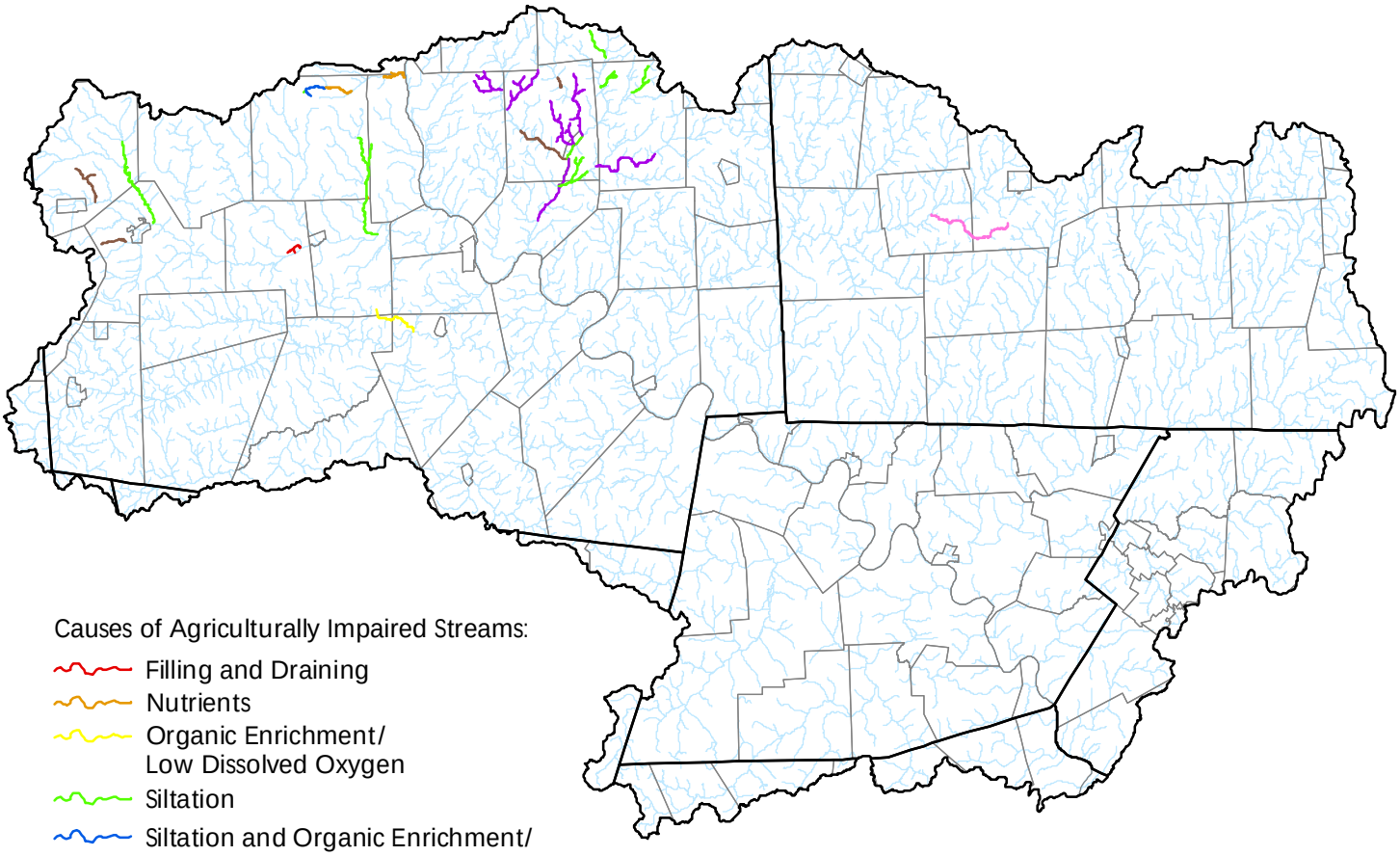
NWI digital data files are records of wetlands location and classification as developed by the U.S. Fish & Wildlife Service. The classification system was adopted as a national classification standard in 1996 by the Federal Geographic Data Committee.

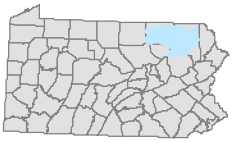
National Wetlands Inventory



Impaired Streams [6]

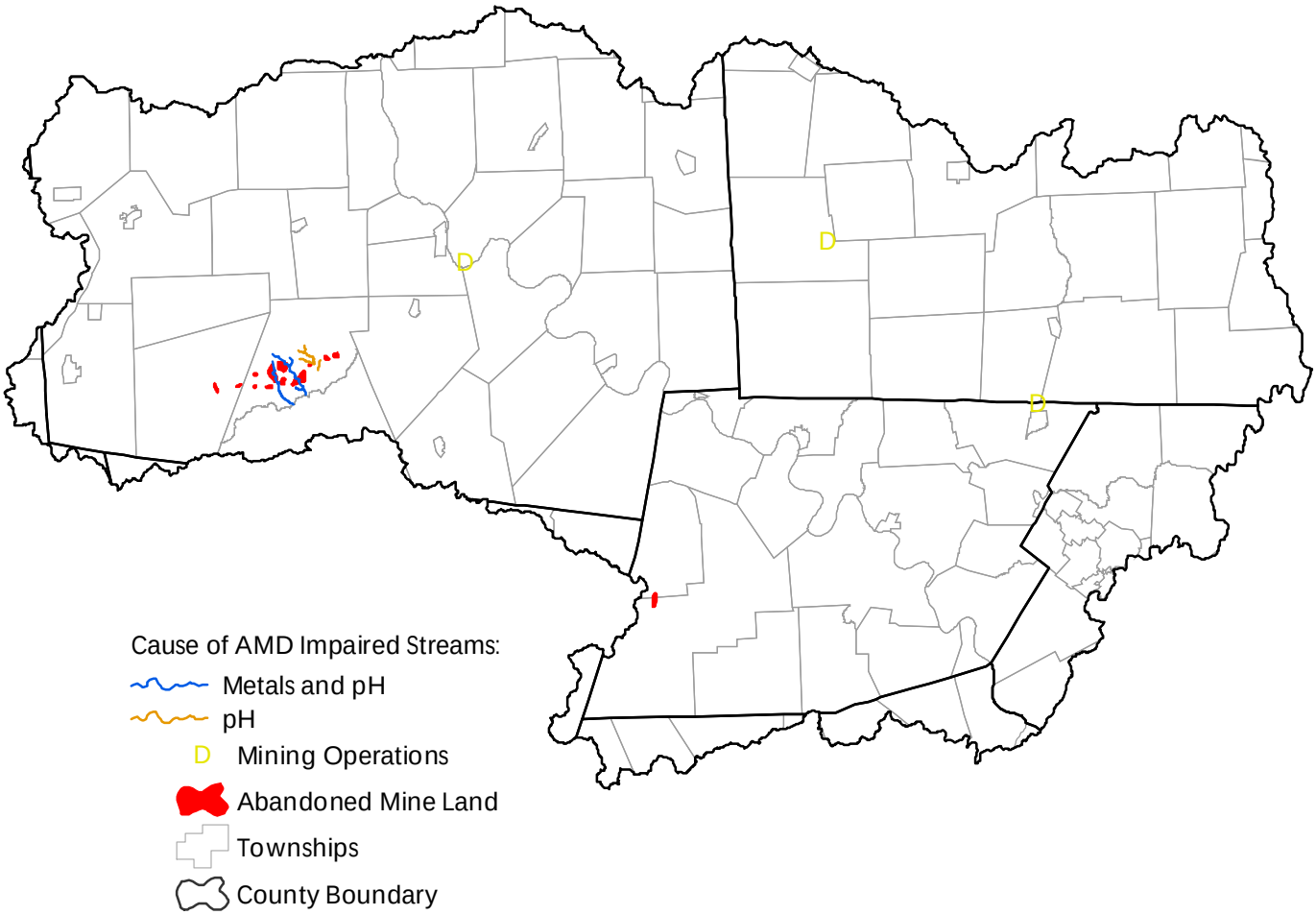
The Streams Integrated List (2006) represents stream assessments in an integrated format for the Clean Water Act Section 305(b) reporting and Section 303(d) listing. PA Department of Environmental Protection protects 4 stream water uses: aquatic life, fish consumption, potable water supply, and recreation. The 305(b) layers represents stream segments that have been evaluated for attainment of those uses and determine which stream are non-attaining.



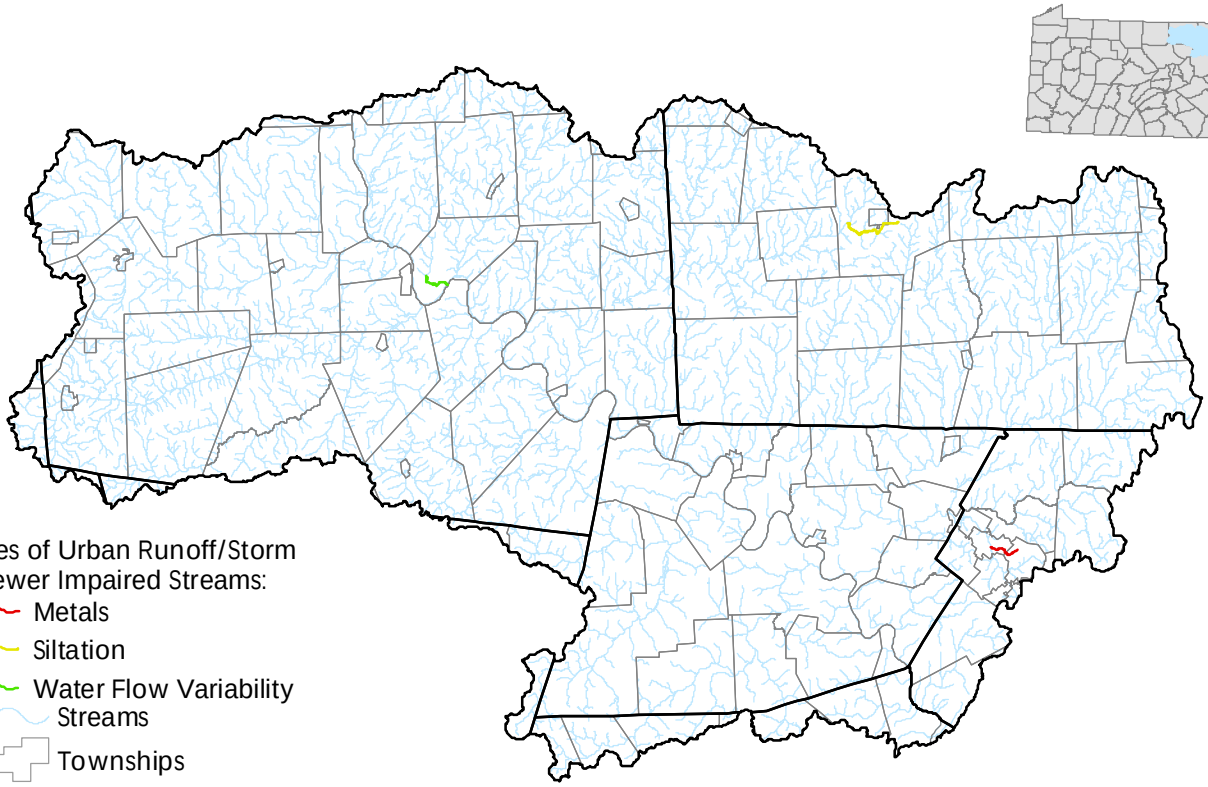


Abandoned Mine Land and Abandoned Mine Drainage Impaired Streams[7]

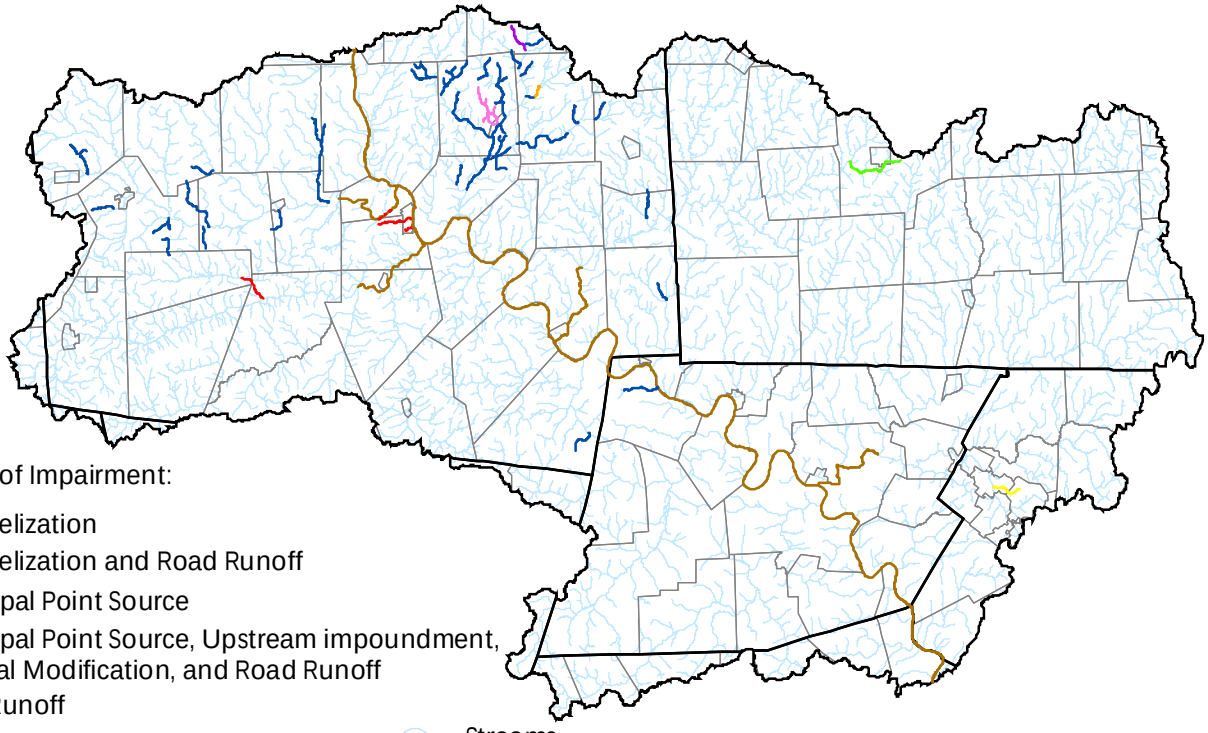
Coal mining in Pennsylvania began in the mid-1700's. Pennsylvania is the fourth largest coal producer in the United States, producing over 69.5 million tons in 1995 in 878 mining operations.
The environmental legacy of hundreds of years of coal mining in PA includes over 2,400 miles of PA's 84,000 miles of streams effected by acid mine drainage from old coal mining operations. Acid mine drainage in the single largest source of water pollution in the state.
Since 1967, Pennsylvania and the federal government have invested close to $500 million to correct problems from abandoned surface and deep mines. There are acid mine drainage treatment plants around the state to treat acid mine drainage discharges.



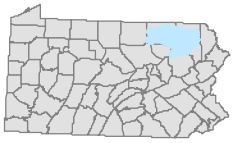
Upper Susquehanna-Tunkhannock Watershed



Causes of Urban Runoff/Storm Sewer Impaired Streams:
- Metals
- Siltation
- Water Flow Variability
- Streams
- Townships
- County Boundary

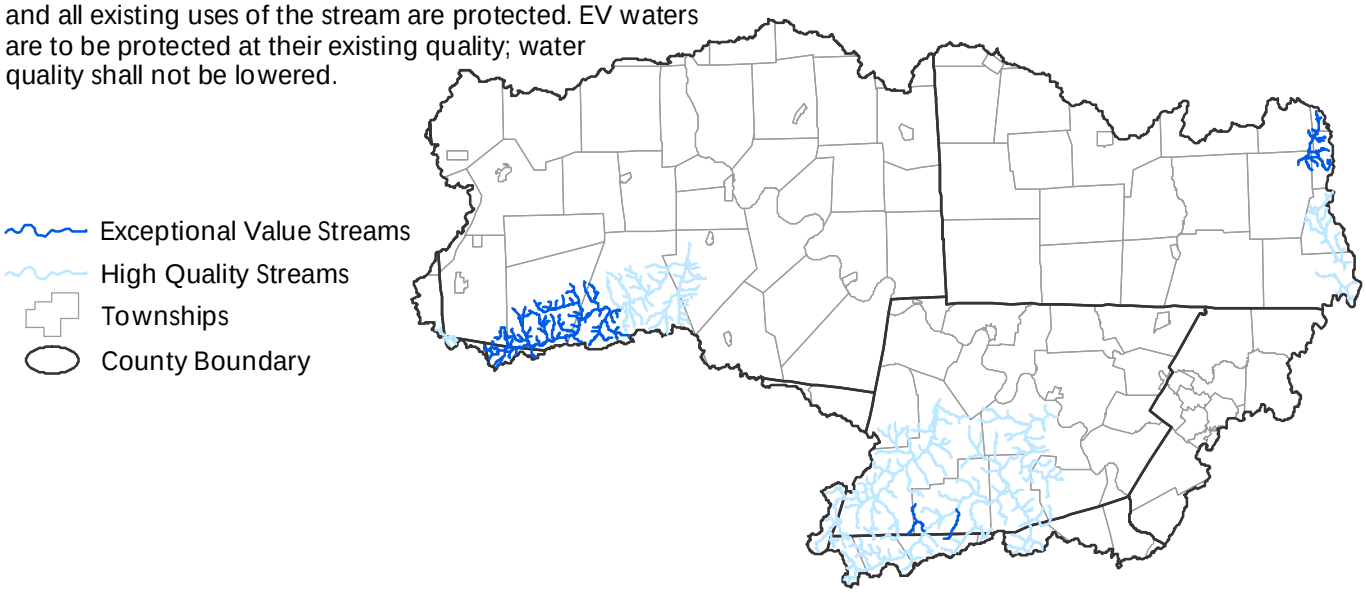


Other Sources of Impairment:
- Channelization
- Channelization and Road Runoff
- Municipal Point Source
- Municipal Point Source, Upstream impoundment, Thermal Modification, and Road Runoff
- Road Runoff
- Road Runoff and Logging Roads
- Road Runoff and Silvaculture
- Unknown
- Streams
- Townships
- County Boundary



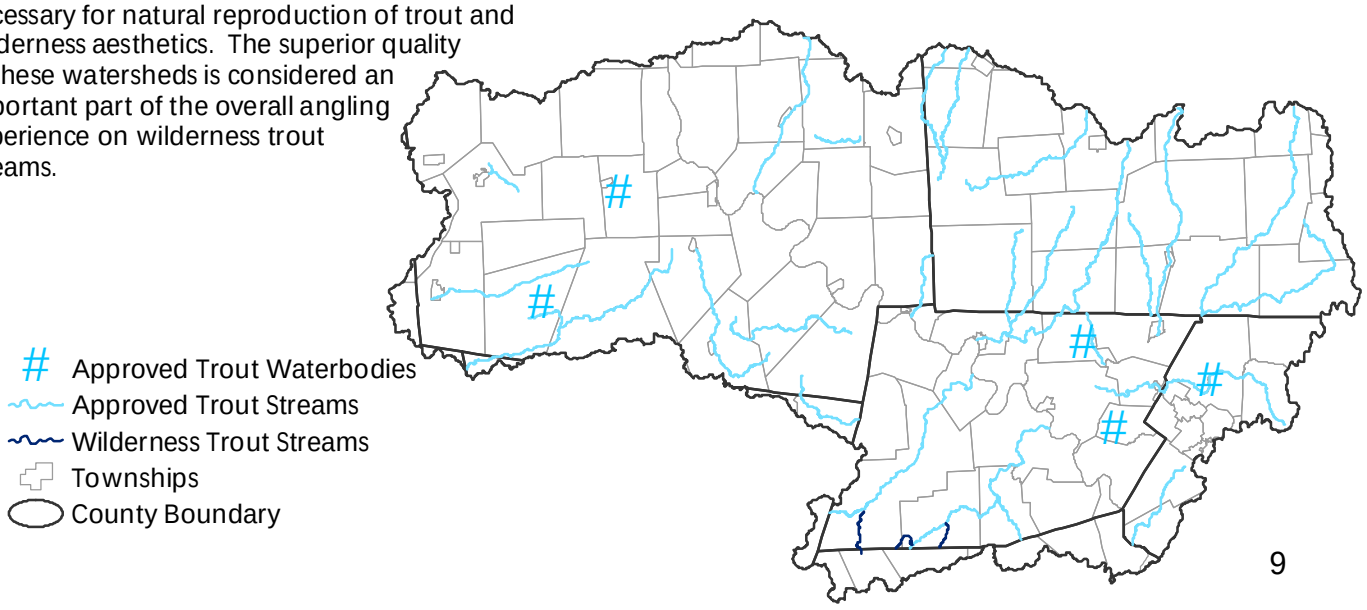
Exceptional Value and High Quality Streams[8]

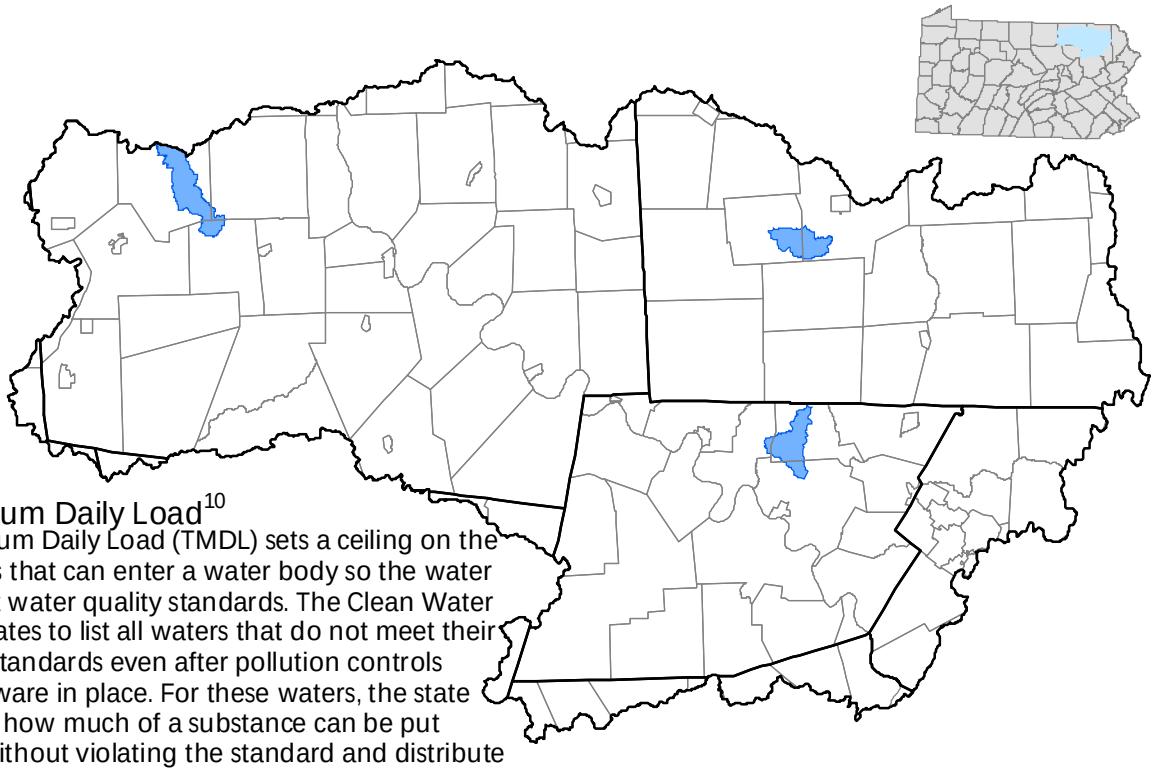
In accordance to Chapter 93 of Pennsylvania Code, streams with excellent water quality may be designated High Quality Waters (HQ) or Exceptional Value Waters (EV). The water quality in an HQ stream can be lowered only if a discharge is the result of necessary social or economic development, the water quality criteria are met, and all existing uses of the stream are protected. EV waters are to be protected at their existing quality; water quality shall not be lowered.



Pennsylvania Trout Waters[9]

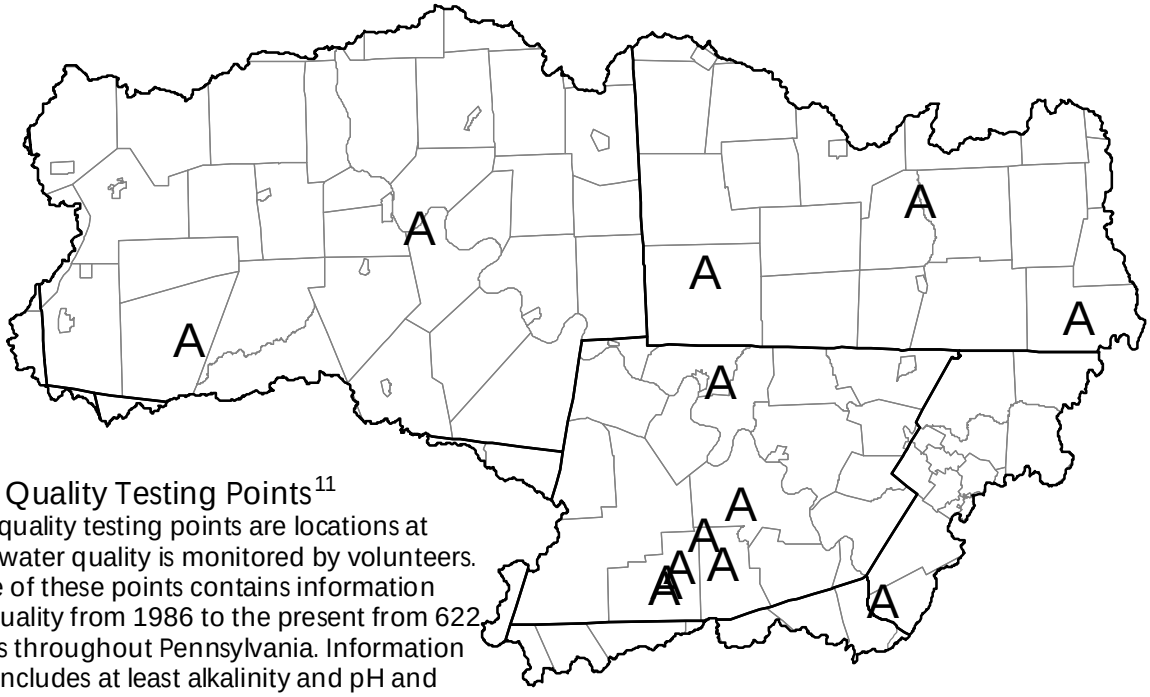
Approved Trout Waterbodies and Approved Trout Streams are waters which contain significant portions that are open to the public for fishing and are stocked with trout. Wilderness Trout Streams are designed to protect and promote native (brook trout) fisheries, the ecological requirements necessary for natural reproduction of trout and wilderness aesthetics. The superior quality of these watersheds is considered an important part of the overall angling experience on wilderness trout streams.





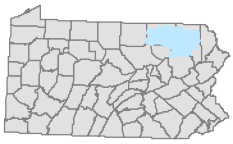
Total Maximum Daily Load[10]

A Total Maximum Daily Load (TMDL) sets a ceiling on the pollutant loads that can enter a water body so the water body will meet water quality standards. The Clean Water Act requires states to list all waters that do not meet their water quality standards even after pollution controls required by laware in place. For these waters, the state must calculate how much of a substance can be put in the water without violating the standard and distribute that quantity to all the sources of the pollutant on that water body. A TMDL plan includes waste load allocations for point sources, load allocations for nonpoint sources, and a margin of safety.
TMDL plans in the shaded areas were due to other reasons then AMD.



Water Quality Testing Points[11]

The water quality testing points are locations at which the water quality is monitored by volunteers. A database of these points contains information on water quality from 1986 to the present from 622 testing sites throughout Pennsylvania. Information in records includes at least alkalinity and pH and includes nitrates and phosphates for some sites since 1996.



Water Resource Points[12]

A Water Resource is a DEP primary facility type related to the Water Use Planning Program. The sub-facility types related to Water Resources that are included are:

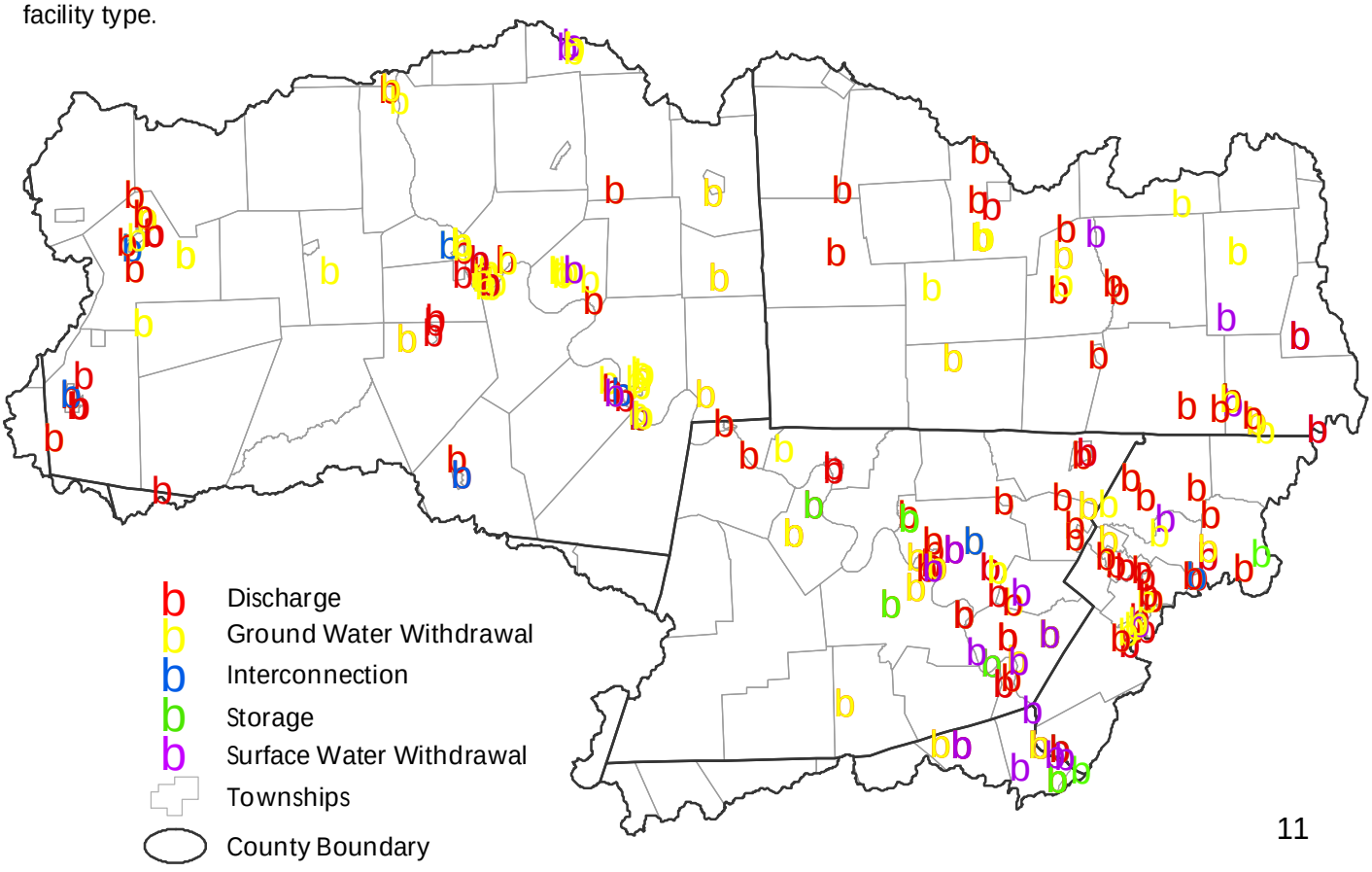
Discharge: represents the return of water used at a Water Resources primary facility. The subfacility type may be a sewage treatment plant, instream discharge, spray irrigation field, groundwater recharge, on-lot septic or an unidentified facility type.

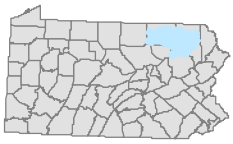
Ground Water Withdrawal: represents the withdrawal of water used at a Water Resources primary facility. The subfacility type may be a well, spring, quarry, infiltration gallery, deep mine, surface mine or an unidentified facility type.

Interconnection: represents the point of interconnection between Water Resources primary facilities. The subfacility type may be for an interconnection between two public water supply agencies or between a public water supply agency and a commercial or industrial water user.

Storage: represents the storage of water used at a Water Resources primary facility. The subfacility type represents raw or treated water storage and may be a quarry, standpipe, open off-stream reservoir, closed off-stream reservoir, instream reservoir, hydroelectric dam, natural lake, pond,silt dam, hydroelectric pumped storage or an unidentified facility type.

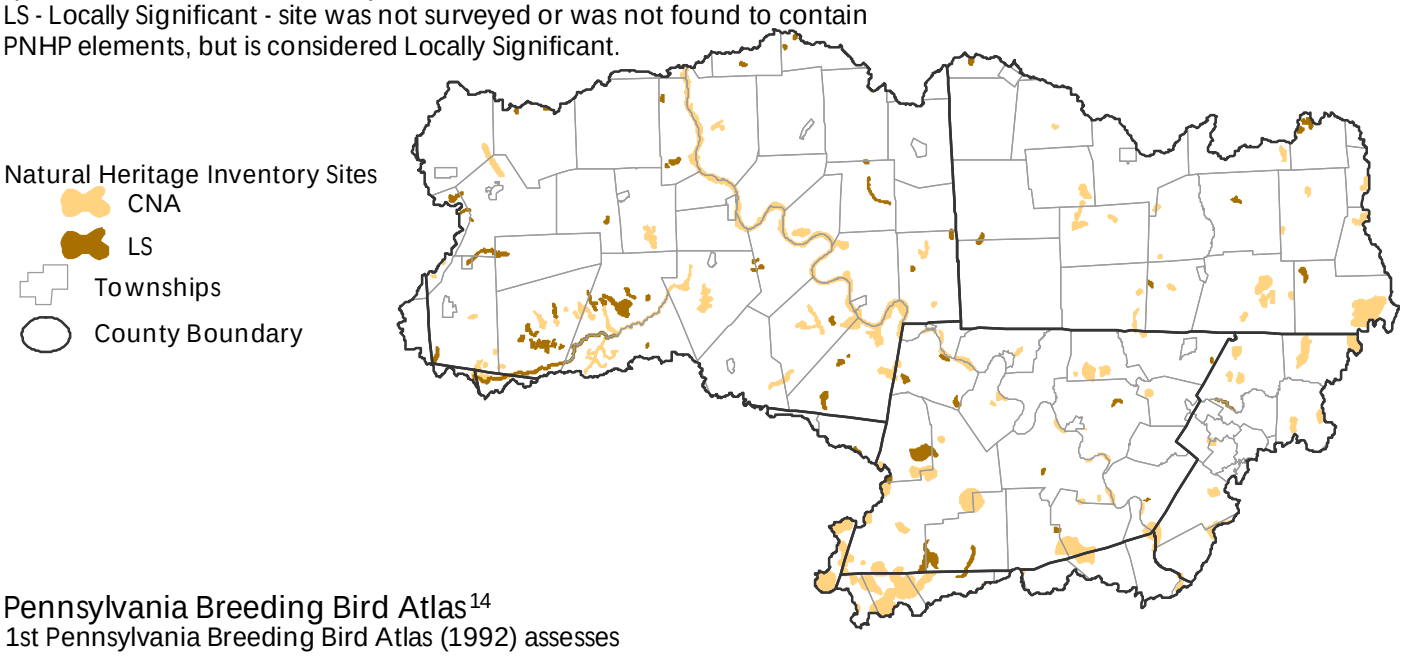
Surface Water Withdrawal: represents the withdrawal of water used at a Water Resources primary facility. The subfacility type may be an instream diversion, intake from a dam, natural lake, pond, river well, or an unidentified facility type.





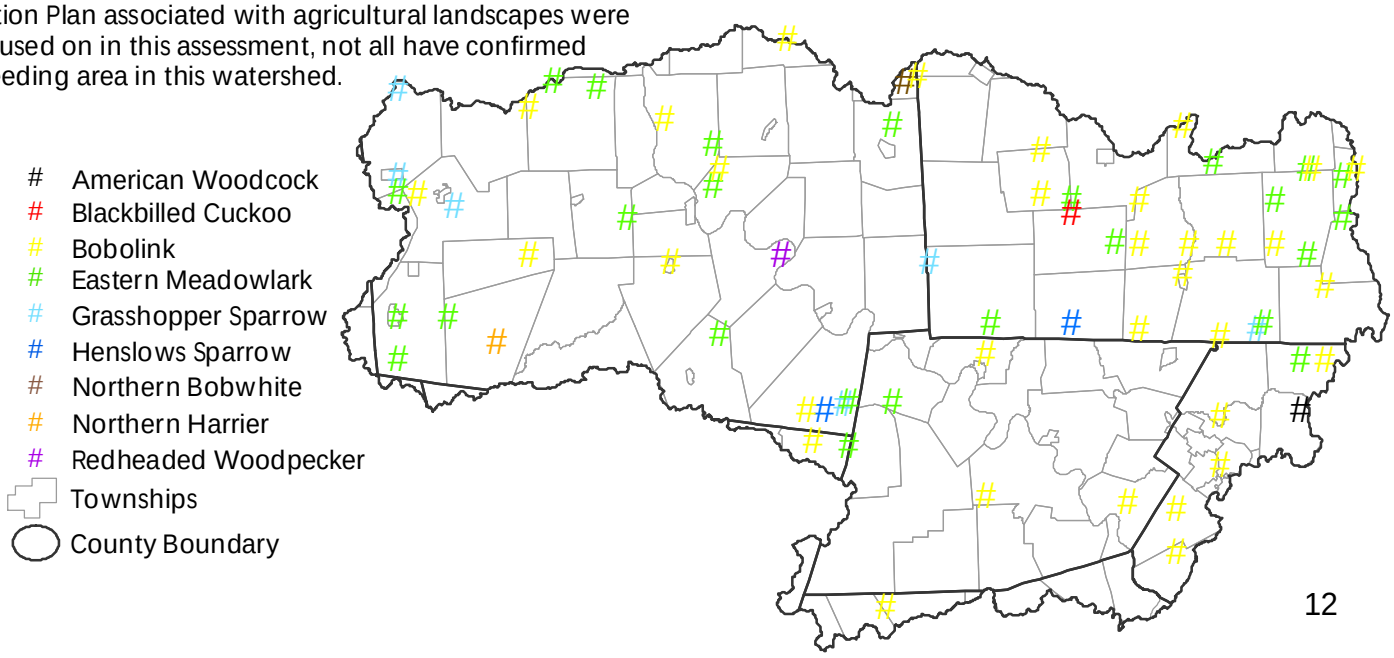
Natural Heritage Inventory Sites[13]

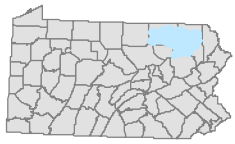
These areas are intended to identify outstanding floral, faunal, and geologic features, including natural communities (habitats) and locations of animal and plant species of special concern (endangered, threatened, or rare. Area Types in this watershed include:
CNA - County Natural Area - an area formerly used by the Eastern Office of PNHP for sites that contain elements of exemplary natural communities or species of concern as tracked by PNHP.
LS - Locally Significant - site was not surveyed or was not found to contain PNHP elements, but is considered Locally Significant.

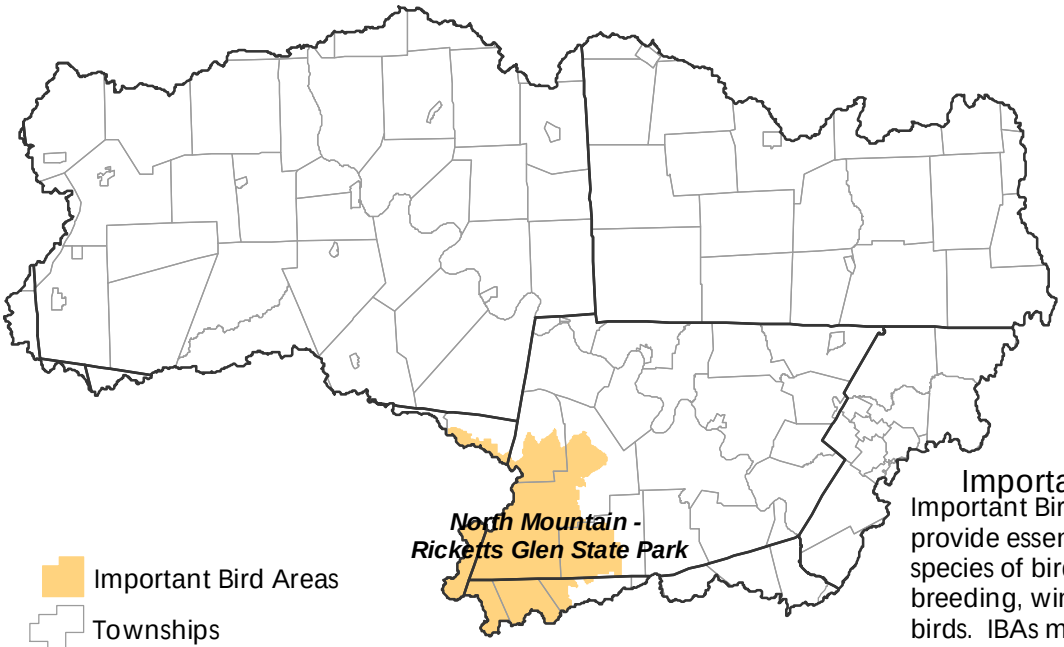


Pennsylvania Breeding Bird Atlas[14]

The 1st Pennsylvania Breeding Bird Atlas (1992) assesses the distribution of breeding birds across the state. The areas below are confirmed breeding areas for species. Fourteen birds species from Pennsylvania's state Wildlife Action Plan associated with agricultural landscapes were focused on in this assessment, not all have confirmed breeding area in this watershed.

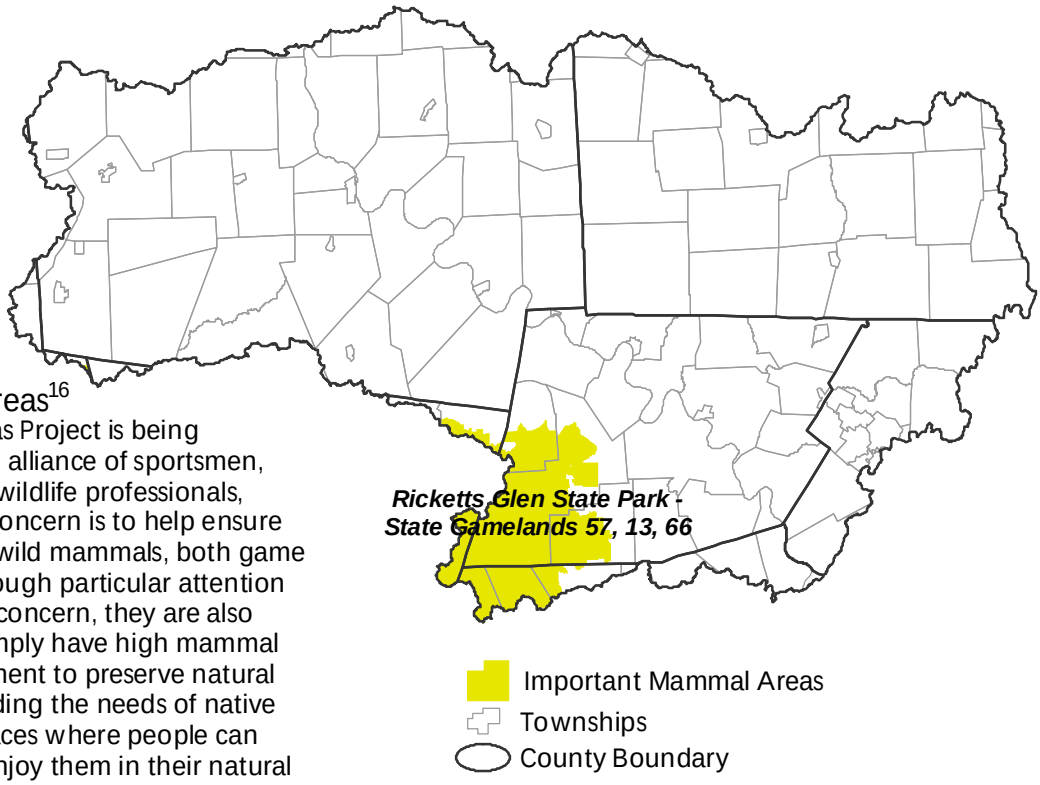






Important Bird Areas[15]

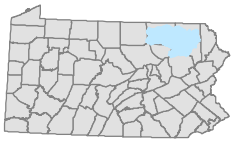
Important Bird Areas (IBA) are sites that provide essential habitat for one or more species of bird. IBAs include sites for breeding, wintering, and/or migrating birds. IBAs may be a few acres or thousands of acres, but usually they are discrete sites that stand out from the surrounding landscape. IBAs may include public or private lands, or both, and they may be protected or unprotected.



Important Mammal Areas[16]

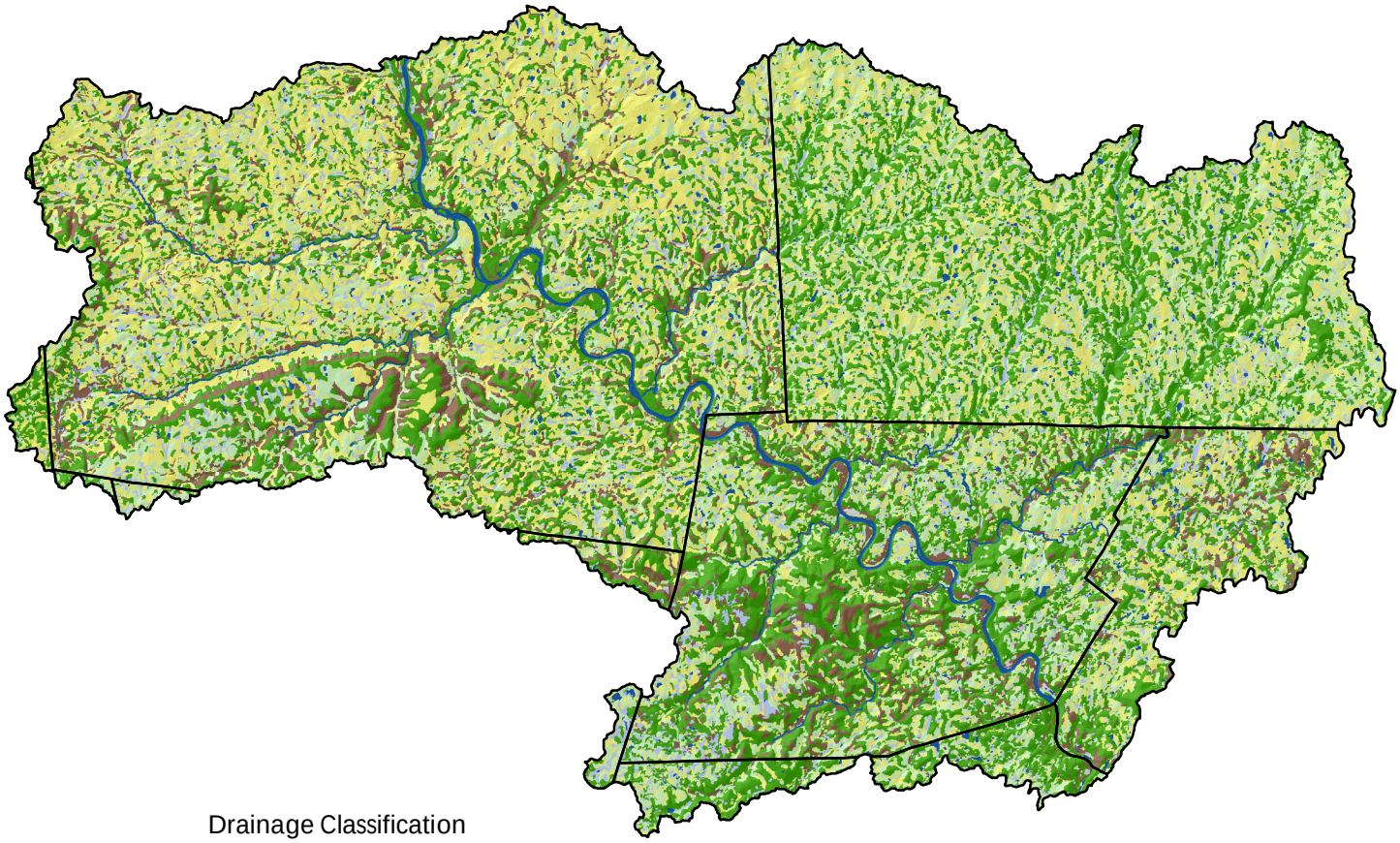
The Important Mammal Areas Project is being carried out by a broad based alliance of sportsmen, conservation organizations, wildlife professionals, and scientists. The primary concern is to help ensure the future of Pennsylvania's wild mammals, both game and non-game species. Although particular attention is given to species of special concern, they are also interested in habitats that simply have high mammal diversity. Because a commitment to preserve natural heritage requires understanding the needs of native species, they also identify places where people can learn about mammals and enjoy them in their natural environment.

Soils [17]

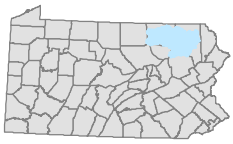


Drainage Classification

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized -- excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

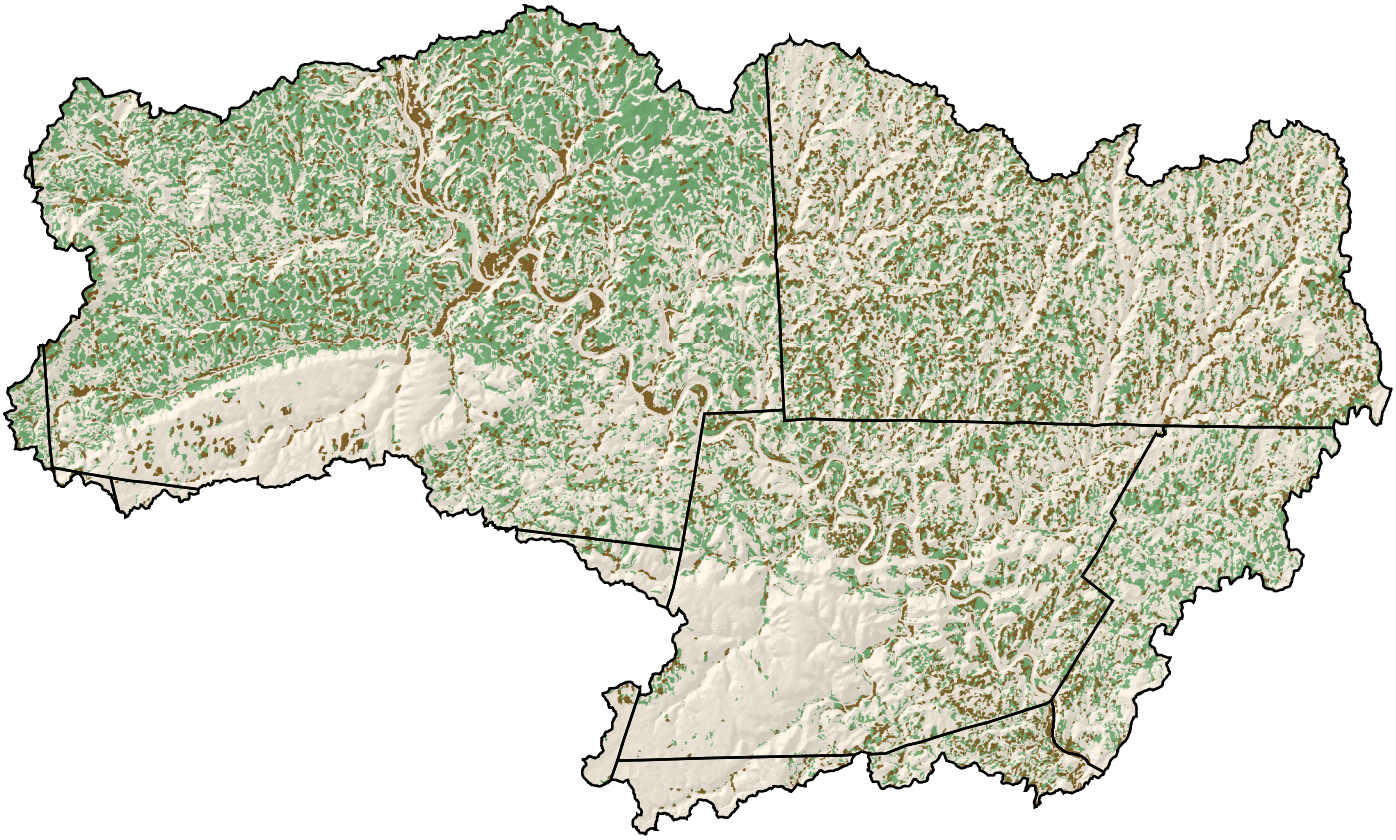


Drainage Classification	% Area
Excessively - Somewhat excessively drained	9.5
Well drained	33.0
Moderately well drained	19.9
Somewhat poorly drained	30.8
Poorly -Very poorly drained	5.0
Water	1.7
Unclassified	.1



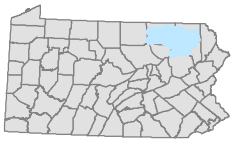
Farmland Classification

Farmland classification identifies soil map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No. 21, January 31, 1978.



Farmland Classification

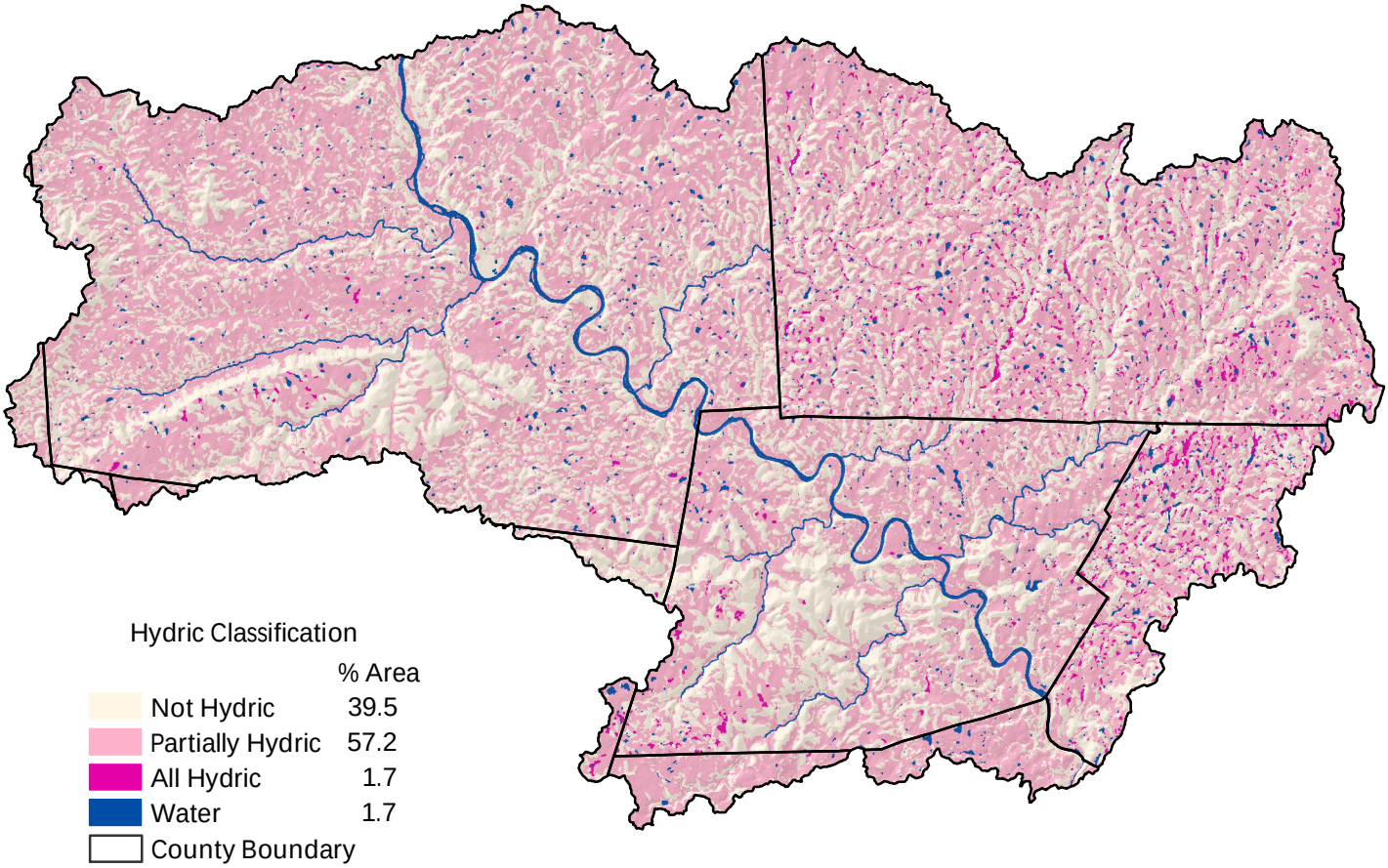
	% Area
All areas are prime farmland	9.1
Farmland of statewide importance	36.8
Not prime farmland or statewide importance	54.1
County Boundary	

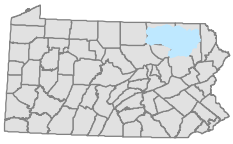


Hydric Soil Classification

This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

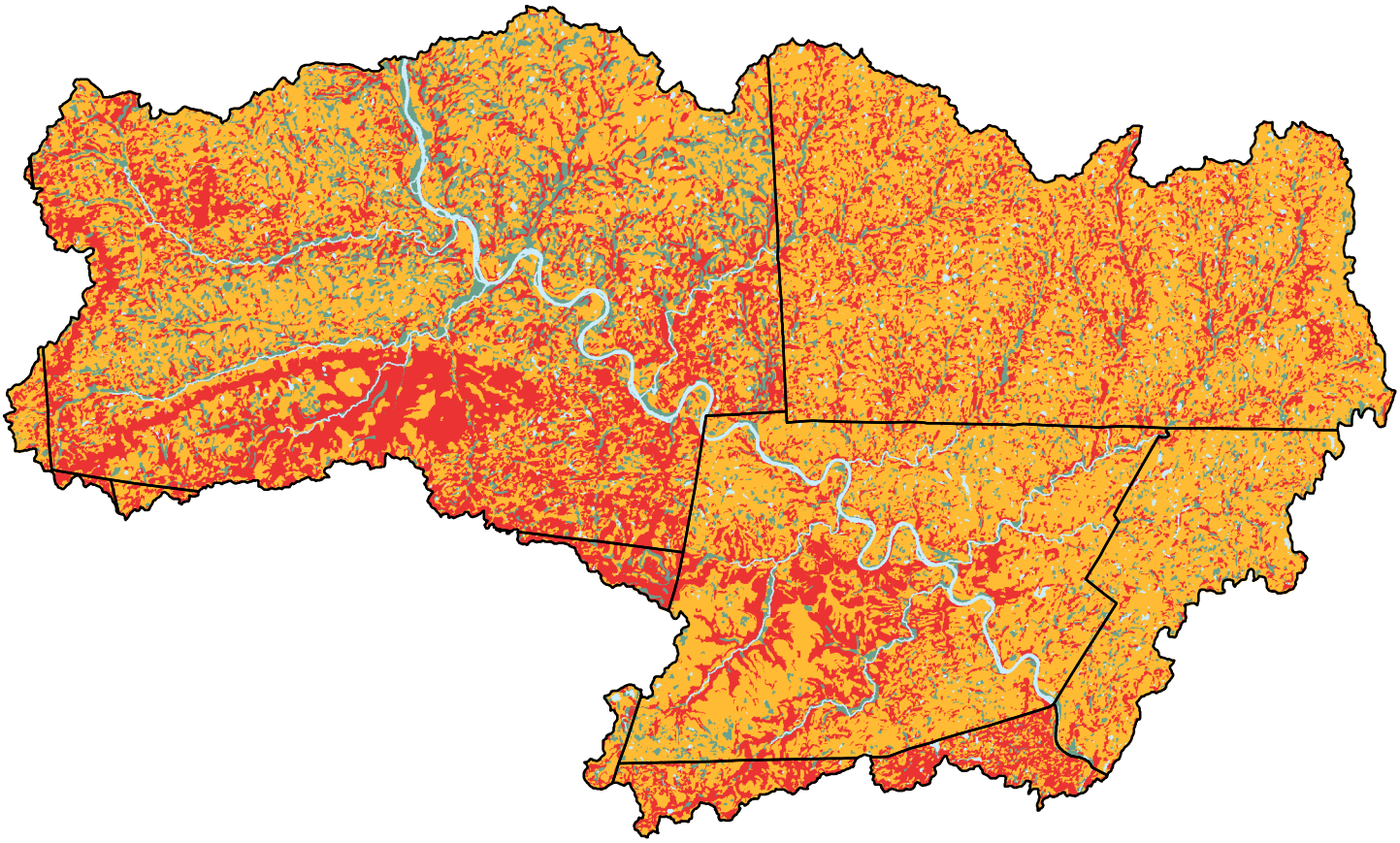
Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.



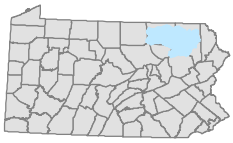


Highly Erodible Land

A soil map with an erodibilty index (EI) of 8 or greater is considered to be highly erodible land (HEL). The EI for a soil map unit is determined by dividing the potential erodibility for the soil map unit by the soil loss tolerance (T) value established for the soil in the FOTG as of January 1, 1990. Potential erodibility is based on default values for rainfall amount and intensity, percent and length of slope, surface texture and organic matter, permeability, and plant cover. Actual erodibility and EI for any specific map unit depends on the actual values for these properties.

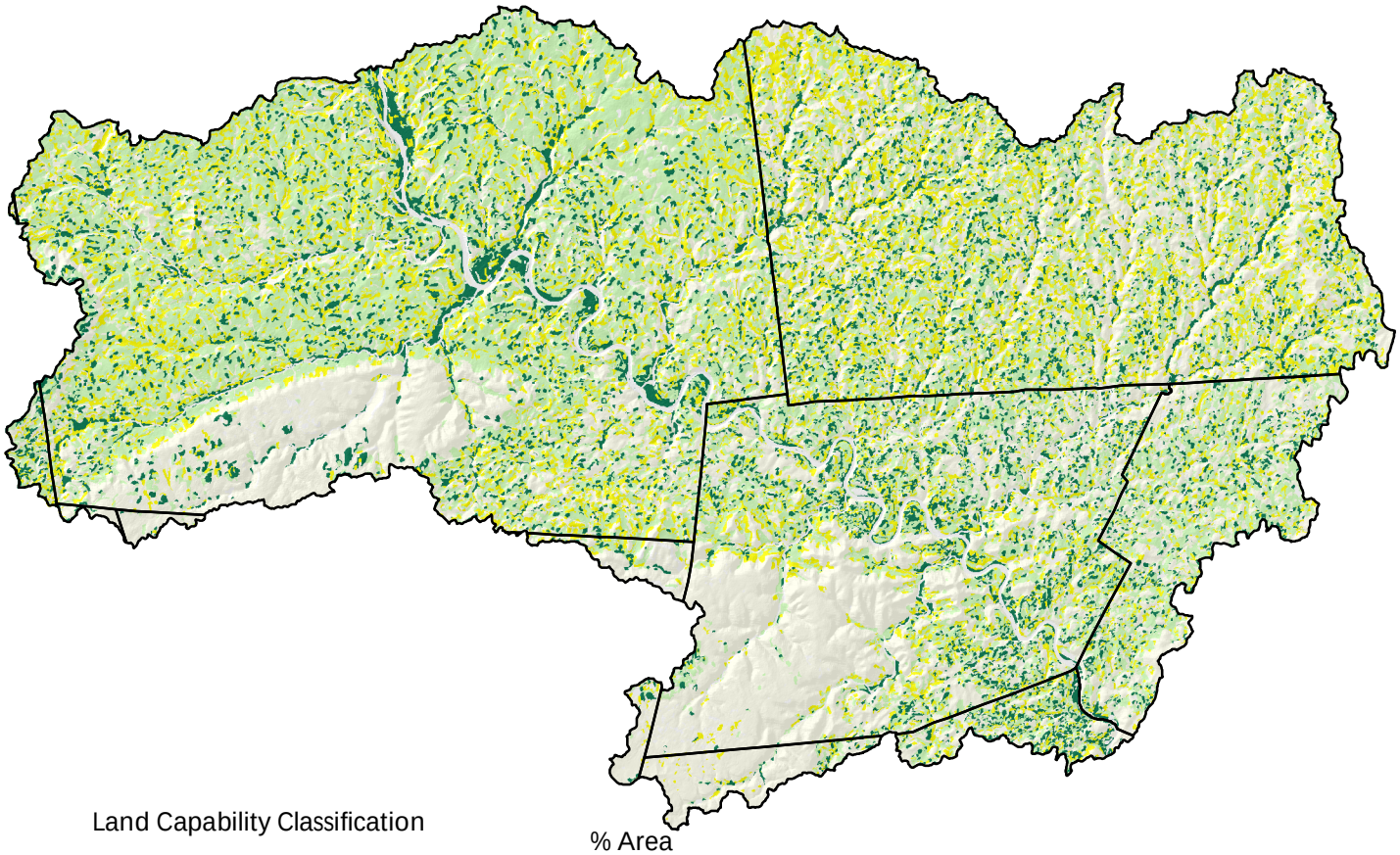


Erosion Classification	% Area
Not highly erodible land	9.7
Potentially highly erodible land	58.4
Highly erodible land	30.2
Water	1.7
County Boundary	

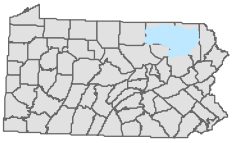


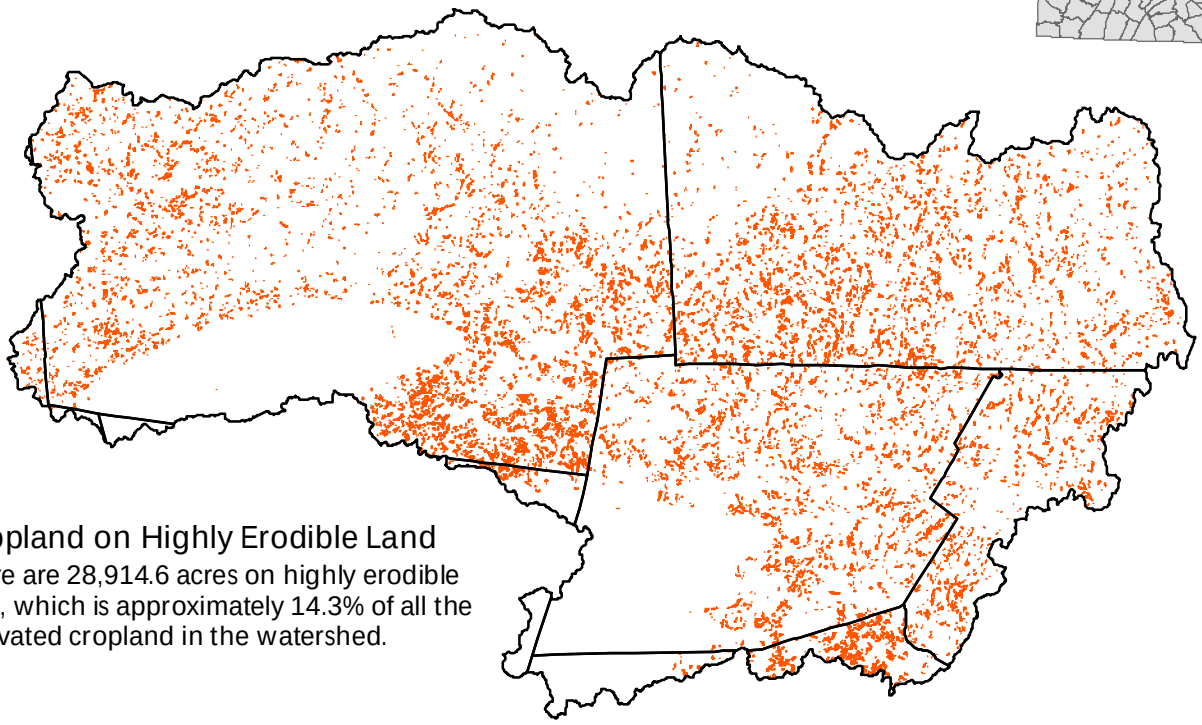
Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.



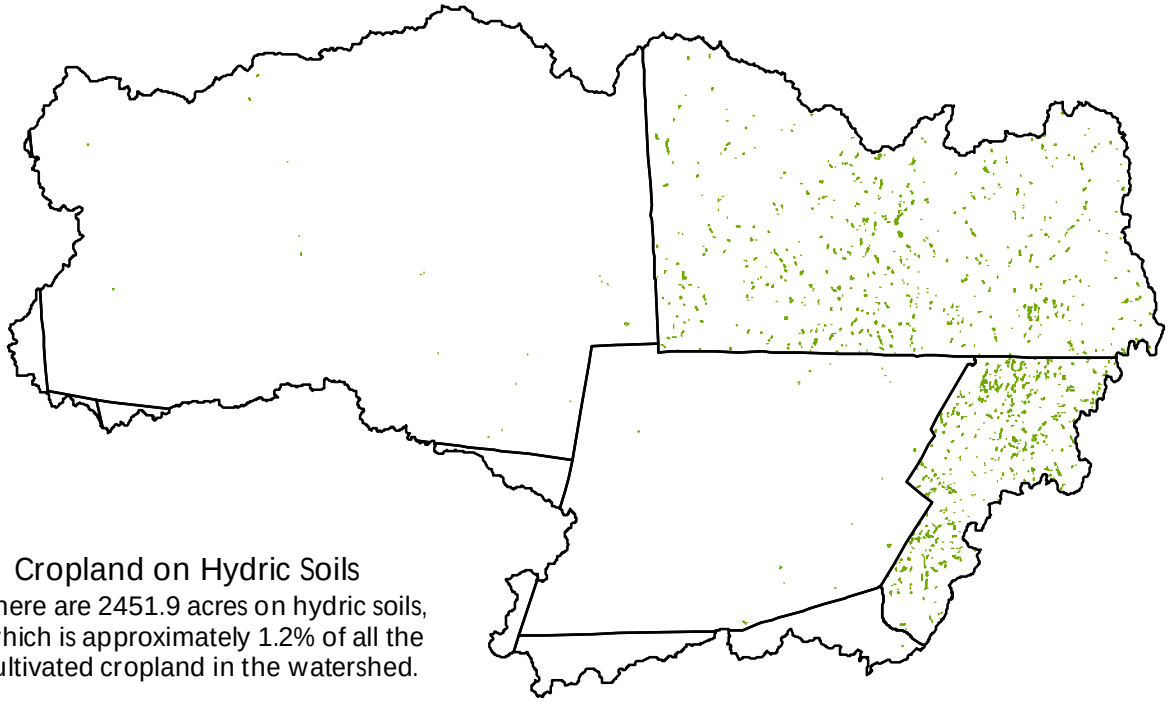
Land Capability Classification	% Area
Well Suited (Capability Class 1 -2)	9.4
Moderately well suited (Capability Class 3)	34.8
Poorly suited (Capability Class 4 -5)	14.5
Unsuited (Capability Class 6 - 8)	39.2
Unclassified	2.1
County Boundary	





Cropland on Highly Erodible Land

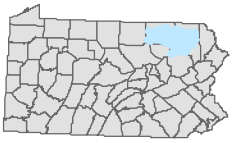
There are 28,914.6 acres on highly erodible land, which is approximately 14.3% of all the cultivated cropland in the watershed.

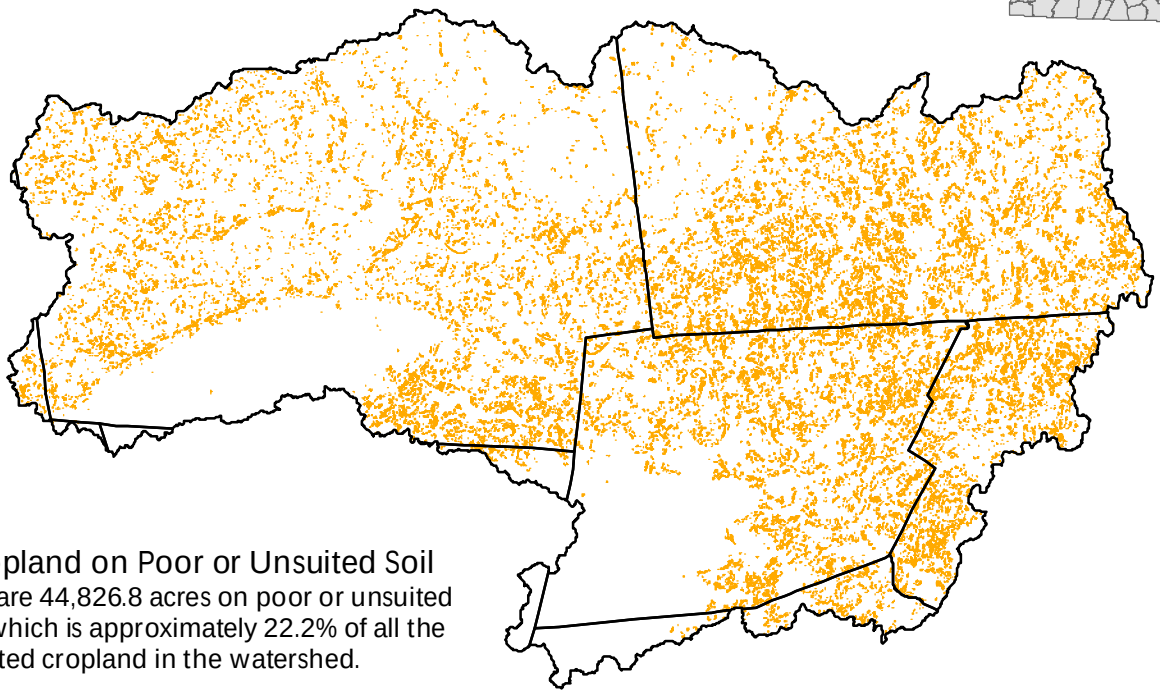


Cropland on Hydric Soils

There are 2451.9 acres on hydric soils, which is approximately 1.2% of all the cultivated cropland in the watershed.

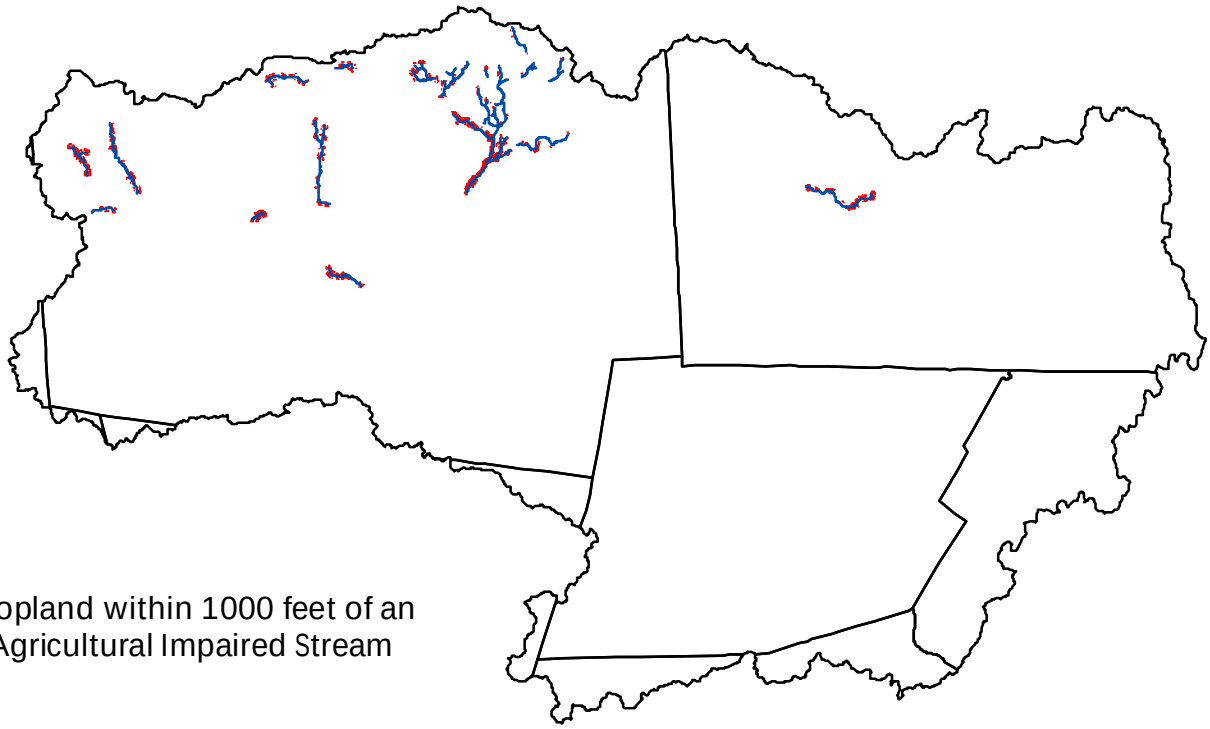
Upper Susquehanna-Tunkhannock Watershed



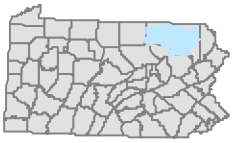


Cropland on Poor or Unsuited Soil

There are 44,826.8 acres on poor or unsuited land, which is approximately 22.2% of all the cultivated cropland in the watershed.



Cropland within 1000 feet of an Agricultural Impaired Stream



Resource Concerns

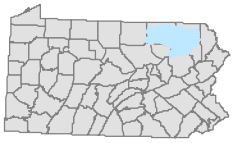
Major resource concerns in the area include:

- erosion
- soil wetness
- maintenance of organic matter on cropland
- soil productivity
- sedimentation

Conservation Practices

Common conservation practices for cropland:

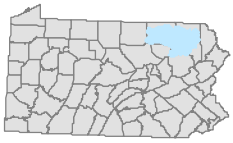
- conservation tillage
- contour stripcropping
- crop rotations
- residue management
- cover crops
- diversions
- grassed waterways



PRS Performance Measures[18]

	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Total
Total Conservation Systems Planned (acres)	7,383	23,661	7,931	8,377	21,307	NA	15,958	16,132	100,749
Total Conservation Systems Applied (acres)	2,498	14,733	6,404	8,783	12,595	NA	14,780	13,913	73,706
Key Conservation Treatments									
Waste Storage Facility (number)	6	31	71	8	6	5	9	5	141
Riparian Forest Buffer (acres)	4	1846	529	147	313	42	707	723	4,311
Erosion Control Total Soils Saved (tons/year)	1608	13,532	5465	6225	9434	NA	NA	NA	36,264
Nutrient Management (acres)	1325	2625	5859	4352	4737	1598	1066	2276	23,838
Pest Management (acres)	0	0	108	525	0	0	598	446	1,677
Prescribed Grazing (acres)	1181	527	904	920	1193	374	548	1013	6,660
Tree and Shrub Establishment (acres)	15	27	99	100	196	25	583	38	1,083
Residue Management (acres)	1505	1568	1074	1512	89	221	2504	913	9,386
Wildlife Habitat (acres)	104	1042	516	1106	936	190	6303	7232	17,429
Wetlands Created, Restored, or Established	90	0	32	161	359	0	102	117	861
Acres in Conservation Programs									
Conservation Technical Assistance									
Planned	3559	22,072	5802	6227	18,425	NA	10,255	11,399	77,739
Applied	1940	14,336	5341	7626	10,033	NA	10,889	8906	59,071
Conservation Reserve Program									
Planned	788	151	188	86	31	NA	7810	4862	13,916
Applied	43	115	289	456	102	NA	5368	7042	13,415
Environmental Quality Incentive Program									
Planned	2871	862	1298	766	1163	NA	1036	4230	12,226
Applied	539	485	724	305	966	NA	622	1653	5,294
Farmland Protection Program / Farm and Ranch Land Protection Program									
Planned	542	420	793	0	0	NA	0	0	1,755
Applied	22	420	732	0	0	NA	0	0	1,174
Forestry Incentive Program									
Planned	0	19	113	4	0	NA	0	0	136
Applied	0	5	4	12	0	NA	0	0	21
Grasslands Reserve Program									
Planned				0	569	NA	55	0	624
Applied				0	760	NA	0	0	760
Grazing Lands Conservation Initiative									
Planned	0	379	354						733
Applied	0	41	491						532
Wildlife Habitat Incentive Program									
Planned	385	297	473	295	181	NA	357	231	2,219
Applied	409	147	36	9	59	NA	130	52	842
Wetlands Reserve Program									
Planned	2	0	59	18	0	NA	0	95	174
Applied	0	0	45	0	0	NA	0	73	118

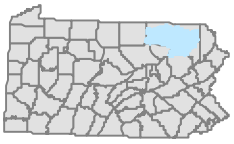
NA - Reporting was unavailabel by Hydrologic Unit Code



Social and Census Data [19]

	Bradford	Lackawanna	Luzerne	Lycoming	Sullivan	Susquehanna	Tioga	Wyoming	Total
Farms (number)	1,132	78	35	1	9	679	8	354	2,296
Land in farms (acres)	228,974	8,858	4,613	177	1,710	115,086	1,600	61,228	422,246
Total cropland (acres)	140,269	5,970	2,485	104	936	63,832	912	35,055	249,563
Principal operator by primary occupation - Farming (number)	674	44	16	1	6	328	4	223	1,296
Farms by Size									
1 to 9 acres	77	9	4	0	1	23	0	19	133
10 to 49 acres	175	17	10	0	1	173	1	57	434
50 to 179 acres	424	40	15	1	4	257	4	155	900
180 to 499 acres	360	11	5	0	3	188	2	104	673
500 to 999 acres	81	0	1	0	1	34	1	17	135
1,000 acres or more	14	1	0	0	0	4	0	2	21
Livestock and Poultry									
Cattle and calves inventory (farms)	730	31	10	1	5	305	5	153	1,240
Cattle and calves inventory - Beef cows (farms)	382	20	6	0	4	167	3	84	666
Cattle and calves inventory - Milk cows (farms)	298	11	3	0	1	130	2	58	503
Hogs and pigs inventory (farms)	64	2	1	0	0	20	1	16	104
Sheep and lambs inventory (farms)	61	1	1	0	0	33	1	10	107
Layers 20 weeks old and older inventory (farms)	88	4	2	0	1	53	1	17	166
Broilers and other meat-type chickens sold (farms)	6	1	0	0	0	7	0	1	15
Crops Harvested									
Corn for grain (acres)	7,280	250	371	18	48	868	45	2,505	11,385
Corn for silage or greenchop (acres)	14,525	193	95	6	83	2,937	54	1,981	19,874
Wheat for grain, all (acres)	51	(D)	76	2	0	42	1	(D)	172
Oats for grain (acres)	1,675	16	113	3	10	112	11	483	2,423
Barley for grain (acres)	68	0	2	0	(D)	0	3	(D)	73
Soybeans for beans (acres)	577	0	124	7	0	(D)	2	(D)	710
Forage - land used for all hay and all haylage, grass silage, and greenchop (acres)	83,727	3,416	812	37	562	36,974	606	19,065	145,199
Vegetables harvested for sale (acres)	251	243	106	1	(D)	41	1	206	849
Land in orchards (acres)	106	49	22	1	(D)	98	1	83	360
Total cropland harvested (acres)	104,723	4,347	1,839	75	712	41,441	719	24,617	178,473
Farm Operator by Ethnicity									
White	1,631	113	49	1	14	1000	11	520	3,339
Black or African American	0	0	0	0	0	2	0	0	2
Asian	1	0	0	0	0	1	0	0	2
Hispanic	8	2	0	0	0	2	0	8	20
American Indian/Alaskan Native	5	0	0	0	0	0	0	0	5
Pacific Islander	2	0	0	0	0	0	0	0	2
Women	431	24	12	0	3	295	3	148	916

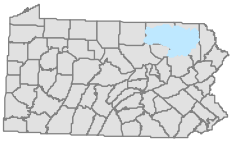
(D) - Withheld to avoid disclosing data for individual farms



Partnership Groups:

A cooperative project involving NRCS and conservation partners, including:

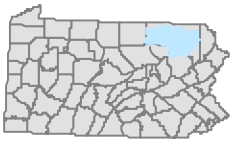
- State Conservation Commission
- Pennsylvania Department of Environmental Protection
- Pennsylvania Game Commission
- Pennsylvania Grazing/Forage Lands Conservation Coalition
- Pennsylvania Fish & Boat Commission



Footnotes/Bibliography

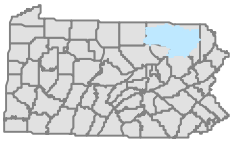
All data is provided "as is". There is no warranties, express or implied, including the warranty of fitness for a particular purpose, accompanying this document. Use for planning purpose only.

1. Common Resource Area
   Common Resource Area (CRA) delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. More information can be found online at http://soils.usda.gov/survey/geography/cra.html
2. National Elevation Dataset (NED)
   The NED is a seamless mosaic of the best-available elevation data. The primary source data were the USGS 7.5-minute (30-meter or 10-meter resolution) DEM's. A hillshade grid was also created using the DEM and used to creare a 3-D effect. More inforamtion on NED can be found online at http://ned.usgs.gov/
3. Land Use / Land Cover 2001
   Land Use / Land Cover map was created using the National Land Cover Dataset. The National Land Cover Dataset was compiled from Landsat satellite TM imagery with a spatial resolution of 30 meters and supplemented by various ancillary data (where available). More inforamtion can be found online at http://landcover.usgs.gov/
4. Average Annual Precipitation
   The average annual precipitation data for this map layer were produced through a partnership between NRCS and the Spatial Climate Analysis Service at Oregon State University (OSU). The average annual precipitation is from 1961 through 1990. More information can be found online at http://www.ncgc.nrcs.usda.gov/products/datasets/climate/index.html
5. National Wetlands Inventory (NWI)
   The NWI maps do not show all wetlands since the maps are derived from aerial photointerpretation with varying limitations due to scale, photo quality, inventory techniques, and other factors. More information can be found online at http://www.fws.gov/nwi/
6. Impaired Streams
   Impaired Streams were derived from Pennsylavania Department of Protection Office of Water Management, 2006 list on Non-Attaining Streams. More information can be found on DEP website at http://www.depweb.state.pa.us/dep/site/default.asp
7. Abandoned Mine Land
   Abandoned Mine Land data was received from the Office of Surface Mining. The data set shows the approximate location of Abandoned Mine Land Problem Areas containing public health, safety, and public welfare problems created by past coal mining. More information can be found online at http://www.osmre.gov/osmaml.htm
8. Exceptional Value and High Quality Streams
   Exceptional Value and High Quality Streams were taken from the Chapter 93 data layer received from Pennsylvania Department of Environmental Protection. For more information on what qualifies a stream as exceptional value or high quality or any information on Chapter 93 streams go to http://www.pacode.com/secure/data/025/chapter93/chap93toc.html



Footnotes/Bibliography

9. Pennsylvania Trout Waters
   Pennsylvania Trout Water data is compiled by the Pennsylvania Fish and Boat Commission. This layer was created based on the 1:24000 National Hydropahy Dataset (NHD) water bodies layer. More information can be found online at http://www.fish.state.pa.us/fishpub/summary/troutwaters.html
10. Total Maximun Daily Load (TMDL)
    TMDL is the sum of the individual waste load allocations and load allocations which would not produce a violation of water quality standards. The data used is from 2003, the PA Department of Environmental Protection is currently working on updating the GIS data available. More information can be found on TMDL locations in PA at http://www.dep.state.pa.us/watermanagement_apps/tmdl/, and/or nationally at http://www.epa.gov/owow/tmdl/
11. Water Quality Testing Points
    Water Quality Testing Points monitor water quality with emphasis on stream acidity in Pennsylvania with an assoiciated database. The database contains more than 33,466 records on water quality from 1986 to the present from 622 testing sites throughout Pennsylvania. Information in the records includes alkalinity and Ph and includes nitrates and phosphates for some sites since 1996.
    The information is maintained by the Alliance for Aquatic Resource Monitoring. More information can be found online at http://alpha.dickinson.edu/storg/allarm/allarm%20projects/database.htm
12. Water Resource Points
    A Water Resource is a DEP primary facility type related to the Water Use Planning Program. More information can be found http://www.depweb.state.pa.us/dep/site/default.asp
13. Natural Heritage Inventory Sites
    The Natural Areas polygons were developed by the Pennsylvania Natural Heritage Program (PNHP) County Natural Heritage Inventory (CNHI) Program. Natural Areas were identified using map and air photo interpretation, aerial rconnaissance, and field surveys. More information and county reports can be found online at http://www.naturalheritage.state.pa.us/
14. Pennsylvania Breeding Bird Atlas
    Data was taken for the 1st Pennsylvania Breeding Bird Atlas (1992). For this watershed assessment, fourteen bird species were chosen to be focused on. More information about all bird species can be obtained at http://www.carnegiemnh.org/atlas/home.htm
15. Important Bird Areas
    The Important Bird Areas Program (IBA) is a global effort to identify and conserve areas that are vital to birds and other biodiversity. For more information nationally and/or on the state level go to http://www.audubon.org/bird/iba/
16. Important Mammal Areas
    Important Mammal Areas Project, IMAP, the first program of it's kind, was created by the Mammal Technical Committee of the Pennsylvania Biological Survey (PaBS). For more inforamtion go online to http://www.pawildlife.org/imap.htm



Footnotes/Bibliography

17. Soils

    Soil Survey spatial and tabular data were used for the following survey areas:

    Bradford County (PA610)
    Lackawanna County (PA069)
    Luzerne County (PA079)
    Lycoming County (PA081)
    Sullivan County (PA610)
    Susquehanna County (PA115)
    Tioga County (PA117)
    Wyoming County (PA131)

    Spatial and tabular data an be downloaded at http://soildatamart.nrcs.usda.gov/

18. Performance Results System (PRS)

    PRS data was extracted from PRS by year, conservation system, conservation practice, and proagrams by hydrologic unit code. More information can be found online at the PRS homepage http://ias.sc.egov.usda.gov/prshome/

19. Social and Census Data

    Ag census data and ethnicity data were downloaded from the National Agricultural Statistics Service (NASS). The data was adjusted by percent of Hydrologic unit in the county. More inforamtion can be found online at http://www.nass.usda.gov/Census_of_Agriculture/index.asp